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THE NERVOUS AND CHEMICAL CONTROL OF THE UTERUS.¹

By F. A. MAGUIRE, F.R.C.O.G.,
Sydney.

THE means by which the uterus is controlled and its muscular apparatus brought into play or inhibited has been the subject of speculation and investigation for many years. We have not yet got to the bottom of this problem.

Nature has designed the uterus as an organ peculiarly modified to receive the fertilized ovum, to embed it and give it a home, to nourish the growing foetus, and at the right time to expel the living foetus and with it, or after it, the remains of the completely developed ovum. The uterus has, therefore, a strong muscular wall and a succulent and peculiarly arranged lining—the endometrium. The muscular wall is modified in such a way that the lower part of the uterus, including the cervix in particular, acts as a sphincter muscle, maintaining the uterus as a closed bag for the full nine months of uterogestation. The rest of the uterus expands greatly during that time; the muscular wall becomes thickened, hypertrophied and prepared for the great muscular effort of expulsion of the fully matured foetus. When term has come the lower part of the uterus relaxes and opens, while the upper part of the uterus contracts and retracts to expel the full-time foetus through the birth passages, which consist of the

lower portion of the uterus, the cervix, the vagina and the vulva.

What are the factors which control this extraordinary series of events? What is it that prevents the uterus from expelling its contents at any time during gestation? We know, as a matter of fact, that two out of five pregnancies terminate in abortion; but we are considering the three out of five which normally go to full term. What is the agency which keeps the uterus from going into strong contraction, dilating the cervix and expelling the contents before the two hundred and eighty days which Nature has set for a full-time gestation? Is it nervous in origin? Is it chemical or is it due to a combination of endocrine actions? We are not yet in a position to answer this with accuracy, nor with satisfaction to ourselves. Let us consider the various factors and see how they are arranged and what part they may play.

The Nervous Control of the Uterus.

The uterus is composed of involuntary muscle; therefore it comes under the control of the autonomic nervous system. It is only within the last fifteen or twenty years that our knowledge of the involuntary or autonomic nervous system has been extended. Even today we do not know all the factors which control or modify the action of the autonomic system. We recognize that it is divided into two parts, (i) the sympathetic or thoraco-lumbar outflow, and (ii) the parasympathetic or cranio-sacral outflow. The work of Cannon in his classical book "The Bodily Effects of Fear, Pain, Hunger, Rage" has shown that the sympathetic system is designed for mass action—for fight or flight—and is stimulated to action by adrenaline. It is described as being adrenergic. The parasympathetic system, on the other hand, comprises the

¹ Read at a meeting of the New South Wales State Committee of the Royal College of Obstetricians and Gynaecologists, held on May 28, 1948, at the Women's Hospital, Crown Street, Sydney.

nerves of comfort and rest—the nerves of anabolism as opposed to the catabolism caused by the sympathetic system. The parasympathetic system is activated by acetylcholine and so is said to be cholinergic. In broad terms we may say that when hollow organs are concerned the sympathetic nervous system causes contraction of circular or sphincter muscles and relaxation of muscle walls, keeping the organs in a state of rest while the heart, lungs and general body muscles are in full action. On the other hand, the parasympathetic system, the nerves of comfort, relaxes sphincters and contracts body walls when the individual has come to rest. It therefore empties hollow viscera. It is known that the uterus receives both a sympathetic and a parasympathetic nerve supply. The sympathetic nerve supply comes from the second, third and fourth lumbar nerves by way of the lumbo-sympathetic ganglia, which in turn send rami to the aortic ganglia and particularly to the inferior mesenteric ganglia. From the latter they pass by way of the aortic sympathetic nerves down in front of and behind the common iliac artery, forming the hypogastric or, as it is also called, "the pre-sacral" nerve, where they enter into the superior hypogastric plexus. They are continued on by nerves which run into the inferior hypogastric plexus situated in either side of the rectum, and are then carried on into a large pelvic ganglion, the ganglion of Frankenhauser, where they come to an end in cell stations in the ganglion. The final relay is carried on by nerves which run along the utero-sacral folds, reach the cervix and then are distributed throughout the body of the uterus. We do not know their exact distribution, nor have we yet traced their final and ultimate destination in the uterus. By analogy they must travel by the blood vessels and are probably closely associated with the uterine blood vessels and through them reach the plain muscle of the body of the uterus. This plain muscle is arranged in three layers—an outer longitudinal layer, a middle mixed layer and an inner circular layer; but these cannot be clearly defined from one another by dissection.

The parasympathetic nerves come from the sacral outflow and pass by branches which run from the second, third and fourth sacral nerves, the so-called "*nervi erigentes*". They, too, pass to the ganglion of Frankenhauser, but pass through it and terminate in a series of ganglia which are found in the region of the cervix and the small portion of the body of the uterus immediately above it, which corresponds to the lower uterine segment, and in the upper part of the vagina. No ganglion cells have yet been found in the body of the uterus above the level of the lower uterine segment. It is to be noted, however, that many authorities deny that the parasympathetic nerves and the *nervi erigentes* reach the uterus at all. Many maintain that they are distributed mainly to the vessels of the vulva and pelvic floor and are associated more with the functions of erection and coitus and preparation for impregnation. But, arguing by analogy with the arrangement in the bladder and rectum, one must assume that the ganglion cells distributed round the cervix and the lower uterine segment are the terminal ganglia of the parasympathetic system. We know that the bladder and rectum correspond in their control with the general arrangement of sympathetic and parasympathetic systems, and that the parasympathetic system relaxes the sphincter and contracts the wall of the viscus, while the sympathetic system contracts the sphincter and relaxes the muscle wall. But the drugs which directly affect the sympathetic and parasympathetic systems, adrenaline and "Prostigmin", have apparently little effect on the uterus. Thus there is some other control apart from the ordinary sympathetic-parasympathetic mechanism.

It has been taught up to ten years ago that uterine control was entirely a sympathetic-parasympathetic mechanism, and it has been pointed out by many authors that the emotions have a tremendous influence on parturition. A patient who is anxious, in pain or in fear will often lose her labour pains, or dilatation of her cervix and lower uterine segment may be very slow. This has been ascribed to the action of the sympathetic system, its action here being brought into line with the function as recognized in other parts of the body. It is

possible that this is so, for within the last few years it has been discovered, mainly through the work of Le Gros Clark, that the sympathetic system is controlled by a centre in the hypothalamus. This in turn is directly under the control of the cortex. Thus the emotions have a direct cerebral and thalamic control over the sympathetic system.

Chemical Control.

Within the last ten years our knowledge has been vastly extended with reference to the control of the musculature of the uterus. Oestrin, derived from the Graafian follicle, and progesterone, derived from the corpus luteum, have been isolated. They are recognized as powerful factors in uterine movement. Oestrin is known to have a direct sensitizing effect on the musculature of the uterus, sensitizing it to the action of pitocin, which comes from the posterior lobe of the pituitary gland. Since oestrin and pitocin are always circulating in the blood of the non-pregnant woman, they keep the uterus constantly in a state of irritation. This probably accounts for the regular contractions that may be recognized in the uterus by appropriate tests. The uterus is constantly undergoing small painless contractions, which are increased at the time of menstruation and which are continued throughout pregnancy as the so-called Braxton Hicks contractions. This would appear to be an expression of the oestrin-pitocin couple, constantly stimulating the uterus to contraction. On the other hand, progesterone, which is produced by the corpus luteum in the non-pregnant woman, but which is produced in vastly increased quantities by the corpus luteum of pregnancy and by the placenta, protects the uterine muscle from the action of pitocin and tends to abolish or at least control the contraction of the uterus. It is well known clinically that uterine spasm can be greatly relieved by the administration of adequate doses of progesterone. It is considered that this takes place by the shielding effect of progesterone protecting the uterine musculature from the stimulating effect of pitocin. Thus from a chemical point of view the explanation of pregnancy and parturition would appear to be the interaction of oestrin and progesterone. During the non-pregnant state oestrin keeps the uterus irritable. Once pregnancy occurs the increase of progesterone from the corpus luteum of pregnancy and, superadded to this, the progesterone from the placenta protect the uterus. But at about eight and a half months the placenta begins to withdraw its secretion of progesterone while the corpus luteum of pregnancy begins to wither about the eighth month. Therefore from about eight and a half months onwards there is a diminution of progesterone and an increase of oestrin in the blood stream. This means that when the ninth month has ended the oestrin has sensitized the uterus so that it reacts to the pitocin circulating in the maternal blood and uterine contractions take place. As a result of this the lower uterine segment is relaxed and dilated, while the upper-uterine segment is contracted and retracted, the fetus being driven down through the open cervix.

But this chemical theory does not in any way account for the difference in action between the upper and lower parts of the uterus. We must remember that the two parts of the uterus, the lower uterine segment (with which is included the cervix) and the upper uterine segment (which forms the main part of the body of the uterus) have diametrically opposite functions. The former has to be dilated to form a birth canal; the latter has to be contracted and expel the contents. What is the factor which makes the lower portion of the uterus relax, become elastic and be expanded and flattened out while the upper part goes into strong action? The only answer we can give to this at present is that we do not know. But many observers, including Wilfred Shaw, have noted this opposing action of the two segments of the uterus.

For the explanation of this we have to look still further back into the history of the uterus. We must recall that the uterus and vagina are developed from a set of tissues entirely different from any other tissue in the abdomen. They are developed from the Müllerian ducts, which occur on the posterior wall of the abdomen from the kidney region down to the pelvis. Very little work has been done

on the embryology of the Müllerian ducts and their associated nerve supply. Nothing is known at present of the arrangement of the nerves or the relations of the various ganglia. Nothing is known of the innervation of the various parts of the genital tract from the commencement of the Fallopian tubes down to the vagina, or of the actual direct relationships of the various lumbar and sacral ganglia to this tube, which stretches through at least nine segments of the body, from the first lumbar to the fourth sacral segment. It is obvious that present explanations of the actions of the uterus are unsatisfactory. In order to find an answer to this problem it will be necessary to investigate closely and carefully the embryological relationships of the various parts of the genital tract and their innervation.

There may still be other factors to be discovered in regard to the chemical control of uterine muscle. There may be other hormones associated with the placenta and with the ovary of pregnancy which have not yet been recognized. The following problems still await satisfactory and complete solutions: (i) inertia of the uterus; (ii) the formation of the retraction ring; (iii) the slow dilatation of the lower uterine segment and cervix in cases in which the uterus seems to be otherwise acting normally; (iv) the generalized expansion of the whole genital tract to allow the expulsion of the foetus; (v) the curious and as yet unexplained phenomenon of retraction of the uterine muscle, for which no chemical or physiological explanation can yet be advanced; (vi) the factors concerned in the involution of the uterus; (vii) the factors producing occasional hyperinvolution or superinvolution, in which the uterus shrinks down to a menopausal condition; (viii) the relaxation of the uterus in accidental hæmorrhage and in severe post-partum hæmorrhage; (ix) spasmodic dysmenorrhœa. Is the answer a nervous, chemical or embryological consideration? All that we can say at present is that we know that there are two separate nervous controls, sympathetic and parasympathetic; but we do not know their distribution or the actual exciting influences. We know, too, that there is in addition a dual chemical control, oestrin on the one hand sensitizing the uterus to pitocin, and progesterone on the other protecting the uterus from the action of pitocin. We do not know the real effects of adrenaline or acetylcholine on the uterus.

Finally, we have in the pelvis three sets of hollow viscera, each of which is designed to act as a reservoir. The bladder is designed to be filled and emptied several times a day. The rectum is designed to be filled and emptied at least once a day in most normal people. The uterus, on the other hand, is designed to be filled perhaps once or several times in a lifetime, to maintain its contents for a full nine months, and then to expel them together with its own lining, and to reconstitute itself in preparation for a similar effort. It does not seem reasonable that the nervous mechanism which controls the bladder and the rectum should in the same way control the uterus, whose function is so entirely different.

I have not in this discussion so far referred to the fact that the uterus has an inherent capacity to contract. It has been recognized for nearly a century that uterine muscle can be isolated entirely from the body and yet will contract rhythmically somewhat after the manner of the heart muscle. This seems to be a capacity inherent in uterine muscle itself. It would suggest that the uterine musculature is specially modified, as is cardiac muscle, in a direction more primitive than the more highly specialized voluntary muscle. It is known that animals who have had the spinal cord completely destroyed can still go to full time and deliver themselves, while women who have transverse sections of the cord above the lumbar region have a normal labour. But it has been found that women who have a destructive lesion in the lumbar region are unable to empty the uterus themselves. There is a case on record of such an accident, in which the woman had to be delivered instrumentally and the placenta had to be removed manually. It is most important that every such case should be recorded in full, because all this information is of the greatest practical value to the clinician.

A BRIEF SUMMARY OF THE INDICATIONS FOR AND METHODS OF INDUCTION OF LABOUR.¹

By T. DIXON HUGHES, F.R.C.O.G.,
Sydney.

METHODS of induction of labour are dependent upon indications, and it is best that we should deal with the various indications first. Of course, the most common indication for induction of labour is toxæmia. When should a patient with toxæmia have labour induced? It may be taken that labour should be induced when either the life of the patient or the life of the foetus is endangered, or before permanent damage is done to the mother. We may assume that the life of the mother is endangered when she is unable to take an adequate diet without increasing her symptoms or when there is a persistent increase in her symptoms in spite of treatment. The death of the foetus is a more problematical matter; the question then depends on the severity of the toxæmia and naturally is involved with the life of the mother. The greatest problems that the obstetrician has to face are those patients in whom the foetus is on the borderline of viability—twenty-eight to thirty weeks. The patient at or near term who has an increasing toxæmia or fulfils any of the previous indications mentioned for induction of labour presents no problems, as induction is automatically called for. However, the patient with a foetus on the borderline of viability presents a difficult problem, and we must take into consideration the menstrual cycle of the patient. Has she a three weeks' or a twelve weeks' cycle? Is there any question about the last menstrual period? Can we look for any help from the radiologist? In this respect one finds that it is of little use trying to depend solely upon ossification centres, because we find that the ossification in males and females differs; the female shows ossification about a month before the male. As an example, the ossification for the talus appears at about seven months in the male and at about six months in the female, and that of the lower end of the femur at eight months in the male and seven months in the female. So we find that we cannot rely on this alone and we must depend upon our clinical judgement.

Having decided that labour should be induced, what method of induction shall we use? If it is not a matter of urgency, medical induction should be tried first. If this fails, provided always that there is no question of disproportion, then one may proceed to a surgical induction. I have used no other method for surgical induction except rupture of the membranes in the past ten years, and I believe that this is the best and safest method of surgical induction. I do not think that any trauma should be inflicted on the patient by means of either speculæ or tenacula, and no surgical induction should take place if there is any question of disproportion. It has been laid down that the cervix should not be longer than half an inch, that the head should be fitting in the pelvis, and that the presentation should be normal. If these rules are adhered to there is less likelihood of trouble; but whatever method one uses to induce labour, it is likely that in some patients it will fail or labour will be long delayed. I have had a patient go for eight days after surgical rupture of the membranes.

If the matter is one of urgency, so that the patient's life is endangered unless the foetus is removed from the mother without delay—a rare instance—then Cæsarean section is indicated. Note that I have said a rare instance; at the Women's Hospital, Crown Street, only three Cæsarean sections were performed last year for this reason. However, I feel that these three patients had their lives saved by Cæsarean section under local anaesthesia for a rapidly increasing toxæmia which had failed to respond to all treatment; anuria was approaching. I do not think that Cæsarean section should be looked upon as a simple

¹ Read at a meeting of the New South Wales State Committee of the Royal College of Obstetricians and Gynaecologists, held on May 28, 1948, at the Women's Hospital, Crown Street, Sydney.

method of terminating labour; but on the other hand I feel sure that it has a place. Once the membranes have been ruptured for over twelve hours the patient should be given sulphonamides and possibly penicillin, and by this means Cæsarean section can be resorted to with a fair degree of safety, either if the patient fails to come into labour or if some obstetrical complication arises.

I have dealt mainly with toxæmia; but the other conditions that call for consideration of induction are diabetes, the Rh factor, cardiac conditions, hypertension, recurrent death of the foetus at or near term, post-maturity and pyelitis.

Diabetes.

There is one school of thought which believes that all pregnant diabetics should have a Cæsarean section. I do not believe that this is a logical approach to the subject, because one must admit that a diabetic, even with our most modern methods of treatment, is not an ideal subject for operation, and I cannot see that the baby has any greater chance of survival if it is taken out through the abdomen than if it is born *per vias naturales*. Therefore, if the head is well in the pelvis and the cervix not longer than half an inch, whether the patient is a *primipara* or a *multipara*, and if it is thought wise to induce labour before term, I see no reason why medical induction or surgical induction should not be tried. In a *multipara* there will rarely be any difficulty in the patient's coming into labour.

Rh Factor.

With regard to the Rh factor, induction is a controversial point and there are two opposing schools. Some on the one hand hold that there is no advantage in inducing labour before term. Others on the other hand believe that if antibodies have not appeared until after the thirtieth week then the child may benefit by being brought into the world at about the thirty-sixth or thirty-seventh week rather than be subjected to the antibodies for the full term of gestation. I myself believe that there is room for induction of labour in selected cases; but there is no point in performing an induction early if the antibody titre has shown up by the twentieth week, and to carry out induction at the thirty-second or thirty-third week only increases the mortality rate.

Cardiac Conditions.

With regard to cardiac conditions, although we know that the blood volume decreases in the last few weeks of pregnancy, some patients are benefited by induction of labour after their acute condition has been controlled and they are well stabilized. As to the method of induction, that has to be decided for each individual patient; however, I believe that Cæsarean section plays no part in the treatment of cardiac patients, and this view is being accepted the world over. There is a definite swing from Cæsarean section to normal delivery for cardiac patients. One only has to think of the period of time for which a pulse rate remains high after Cæsarean section compared with ordinary labour.

Hypertension.

The indications for induction of labour in hypertension are really in the interests of the foetus, because one knows that placental disaster is likely to occur in the last few weeks. Another indication is incipient breakdown of the renal function.

Foetal Death at or Near Term.

I now come to the question of recurrent death of the foetus at or near term. There is no doubt that there is a type of patient who has a history that her baby dies at or shortly after term, and not only on one occasion but on several occasions. To my mind this occurrence is a definite clinical entity. It could, I think, be shown to be due to premature senility of the placenta, the finer points of which are only lately being recognized by pathologists; and this applies also to some of those patients who go past term.

Post-Maturity.

The question of post-maturity is difficult. If I was teaching students I would probably not admit that there was such a thing as post-maturity, because I believe that many women would have many unnecessary inductions of labour; but anyone who has had a large obstetrical experience will know of a patient, generally an elderly *primipara*, who has gone over her expected date and then comes into feeble labour, and the foetal heart stops. Although there may not be such a thing as post-maturity of the infant, I believe that there is post-maturity of the placenta. If one is sure that the gestation has lasted for more than 290 days, then induction of labour is justified, provided always that there is no question of disproportion, when only medical induction should be tried.

Conclusion.

These remarks are of necessity brief, because the time allotted for this paper was fifteen minutes, and the views that I have expressed are my personal views and not necessarily those of the staff of the Women's Hospital.

COMPLICATIONS AND RESULTS OF INDUCTION OF LABOUR.¹

By T. H. SMALL, M.R.C.O.G.,
Sydney.

When one induces labour one becomes responsible for any and all troubles that may follow.—THOMPSON.

THE aim of this paper is to present a number of differing viewpoints, so as to widen the field for discussion rather than survey the subject completely.

The attempt at induction of labour may not be successful and failure may bring its attendant complications.

CHANCES OF SUCCESSFUL INDUCTION.

It is difficult to induce labour as a rule when the following factors are involved: (i) when the cervix is long and hard or the cervical canal tightly closed, the use of metal dilators being required; (ii) when the patient is of hypopituitary, hypothyroid, highly nervous or mentally dull type; (iii) when toxæmia or prematurity exists, and especially if either is in combination with *primiparity*; (iv) when a *multipara* has had a rapid succession of pregnancies or a history of dystocia, inertia, "failed induction" or stillbirth; (v) when the patient has been told that she will need Cæsarean section, or has any other cause for anxiety—for example, previous miscarriages or a long period of sterility; (vi) when the age is over thirty years.

Labour is more readily induced when the following factors apply: (i) the patient is stable and intelligent; (ii) the cervix is short, soft, and easily dilatable with the finger; (iii) toxæmia has gone on to eclampsia (why, I do not know); (iv) cardiac complications are present (again I do not know why); (v) the patient is *multi-parous* but has had well-spaced pregnancies; (vi) the age is below thirty years.

CRITERIA FOR SAFEST INDUCTION (THOMPSON).

The following are Thompson's criteria for the safest induction of labour: (i) the patient should be at term; (ii) some pathological state should exist as a genuine indication; (iii) the presenting part should be the head and should be engaged; (iv) the cervix should be effaced or partly taken up; (v) the cervix should be partly dilated.

SAFETY OF INDUCTION.

Induction of labour is generally better for the mother than Cæsarean section, as it gives good results and leaves

¹ Read at a meeting of the New South Wales State Committee of the Royal College of Obstetricians and Gynaecologists, held on May 28, 1948, at the Women's Hospital, Crown Street, Sydney.

the uterus undamaged by section with possibly weak union. The obstetric career of a woman who may have future normal pregnancies should not be jeopardized by Cesarean section if there is any doubt about the child's ultimate survival.

The maternal mortality of induction of labour is less than that of Cesarean section.

COMPLICATIONS.

The complications are determined by the indication for induction, by the method used and by the mode of delivery. Complications may be considered under eight headings.

1. There may be a prolonged latent period before the onset of labour. The period is normally one to twelve hours, but it may be as long as five days.

2. Complications affecting the powers are irregular uterine action, such as precipitate labour, tetany, abnormal contraction rings, incoordinate action of the uterus, and slow dilatation of the cervix.

3. Complications affecting the passages are partial or complete rupture of the uterus from pituitary extract, perforation by bougies or other instruments, abrasion or laceration of the cervix, and trauma from operative interference later.

4. Complications affecting the passengers may concern the cord, the membranes or the fetus. Prolapse of the cord, especially in breech presentation, floating head and cord presentation, and also perforation of a velamentous insertion in a low placenta may occur.

There may be infection or unintentional rupture of the sac, or both. Malpresentations and bad positions of the fetus may result from bags or packing; instrumental or manual trauma may be inflicted; intracranial hemorrhage may follow violent contractions; inhalational pneumonia may be associated with infected liquor.

5. The mechanism may be abnormal as a result of malpresentations caused by bags, gauze packing *et cetera*.

6. Complications may affect the clinical course of labour. Pyrexia may result from ante-partum or intra-partum infection of the sac or soft tissues by a variety of organisms. Psychic trauma may produce prolonged anxiety, nervous exhaustion or sleeplessness. The duration of labour may be prolonged, or emergency Cesarean section may be required.

7. Complications affecting the puerperium may be the results of trauma, infection and anaesthesia.

8. General complications may be embolism, shock, hemorrhage *et cetera*.

RESULTS.

The figures are determined by the methods of induction of labour and by the ways in which correction is applied.

Maternal Prognosis.

Both mother and child are usually unharmed; but one or both may have their health affected temporarily or permanently by infection or injury, and one or both may die. Summarizing United States reports since 1930, Dieckmann states that the uncorrected foetal mortality rate ranges from 0% to 37% and the maternal mortality rate from 0% to 2.8%.

Mortality.

Browne (United Kingdom) reported that 5% of the maternal deaths of a total of 173 in nine British maternity hospitals staffed by experts followed directly on induction of labour. Gillett, on the other hand, reported 1000 consecutive inductions of labour without any failures or maternal or foetal deaths.

In Sarwey's series of 2000 cases quoted by de Lee there was a general maternal mortality rate of 1.4%, in which 0.6% of deaths were due to infection.

Morbidity.

Morbidity includes mental trauma, often reflected in future labours, as well as the consequences of trauma to the genital tract.

Maternal morbidity due to induction of labour, according to Dieckmann, ranges from 3% to 25%, compared with 7% to 10% average in most hospitals (general morbidity).

Factors influencing the Maternal Prognosis.

Factors influencing the maternal prognosis are the following: the general and pelvic condition; the method used; the number of unsuccessful attempts (as high as 30% according to Dieckmann); associated pathological states; emergency Cesarean section following "failed" induction; operative complications, such as trauma and infection; the type of anaesthesia.

Foetal Prognosis in Induction.

The gross foetal mortality rate varies from 30% to 60%; the corrected mortality rate is of course less, but higher than for normal cases.

Morbidity arises from infection, birth injury and obstetric accidents.

Factors influencing Foetal Prognosis.

The following are factors influencing the foetal prognosis. (i) The severity of the maternal condition for which induction of labour is performed—for example, nephritis, diabetes, toxæmia. (ii) The maturity of the fetus. For every week after the thirtieth the child's chances increase by 10%. The mortality rate is higher between thirty-two and thirty-six weeks than between thirty-six and forty weeks. (iii) The birth weight. A great number of babies survive when the weight is over four pounds. (iv) The degree of maternal pelvic deformity. Induction of labour for even moderate degrees of contraction carries a mortality rate of 10% to 12%. Trial labour at term is preferable. (v) The parity of the mother. In induction of labour in *primiparæ* the foetal mortality rate is 8% to 12%; in multiparous patients it is less. (vi) The method of induction. Different methods carry different risks. (vii) The presentation and position of the fetus; the effect of these is obvious. (viii) Method of delivery. Methods involving handling, forceps and breech extraction are worse for the baby. If the baby is very premature, episiotomy and local anaesthesia remove two hazards. Operative delivery may mean cord entanglement or prolapse, visceral injuries and intracranial hemorrhage. (ix) Multiple pregnancy. A twin is usually smaller than a single fetus, but may be associated with hydramnios or a common placenta, and its delivery may bring about the death of its fellow from premature separation of the placenta. (x) Anaesthesia and drugs. Local anaesthesia and small doses of drugs are safest. (xi) The care of the child after delivery. Thorough cleaning of the air passages, administration of oxygen and special facilities for handling and feeding are big factors in the child's ultimate survival.

COMMONLY USED METHODS.

Medical methods of induction of labour include the use of various drugs singly and in combination. Surgical methods comprise stripping of the membranes, rupture of the membranes, the insertion of bougies, packing of the cervix and lower uterine segment, the insertion of rectal tubes and the insertion of stomach tubes and hydrostatic bags. The injection of liquids and pastes between the uterus and the membranes has been abandoned. Medical and surgical methods have been used in various combinations.

Factors Determining the Method to be Used.

A combination of two or more methods is more certain than any single one. Aspects to be considered before the method is decided on are the general condition of the mother and child, the presence of any local pathological conditions of the skin, cervix, vagina *et cetera*, the relative size and age of the fetus, the age of the patient, and how long she has been married before this pregnancy, the history of previous labours, the number of living children, the prospect for future pregnancies, and the urgency of the condition.

Medical Methods.

The commonest medical methods involve the combination of a dose of castor oil and an enema with the administration of one or more of the following drugs: stilbœstrol, quinine, pituitrin and pitocin.

Stilbœstrol is said to sensitize the uterus to other drugs if given in large doses; a dose of 60 milligrammes in the preceding twenty-four hours has often failed.

Quinine has its dangers. It is a protoplasmic poison and a placenta-passer, having a direct action on the uterine muscle. The mother and fetus may have an idiosyncrasy to it. Small doses stimulate uterine contractions; larger doses are said to inhibit them; excessive doses may produce tetany and death from asphyxia or idiosyncrasy, or congenital deafness from the effect on the auditory nerve. Quinine alone is not usually successful. Meconium in the liquor is common after its use.

Castor oil causes few, if any, complications. It brings about stimulation of the large bowel and by reflex action uterine contraction in some cases.

Pituitrin given by hypodermic or intramuscular injection or the intranasal route is said to increase the intensity of the contractions as well as the tonicity of the uterine muscle, which never relaxes completely, and this may disturb the uterine and placental circulation. As it contains pitressin, it may produce spasm of the coronary arteries (especially if injected directly into the circulation) and also shock. Any degree of rupture of the uterus from minute separation of the fibres to complete rupture may occur, as well as laceration of the cervix. Stillbirth may result from changes in the placental or fetal circulation with petechial or extensive hemorrhages. According to Dieckmann and McCready, pituitrin will not produce any contraction at all unless some dilatation is present, and induction will fail unless the cervix is "ripe" and dilated to one centimetre or more.

Pitocin is the safest pituitary preparation, as it acts only on the uterus.

Results.—Medical methods alone are more often successful if the fetus is at term and the woman parous. After giving pituitary preparations, watch carefully with the hand on the uterus the effect of the first dose to time the contractions and intervals, keeping chloroform ready for use if tetany occurs. Purely medical methods are said to have caused precipitate labour, rupture of the uterus, laceration of the cervix or perineum, and partial tonic contraction of the uterus in the first, second or third stage of labour.

Surgical Methods.

Stripping of the membranes is usually done with the finger or with gauze dipped in "Dettol" cream and held in Howard Kelly forceps. It often fails; but there are few risks of complications other than infection and unintentional rupture of the membranes. Reiss, reporting on 500 consecutive cases in which various medical methods were combined with stripping of the membranes, showed that this procedure slightly increased the percentage of success and that the combination of three drugs—castor oil, quinine and pituitrin—gave the highest percentage, although stripping of the membranes slightly increased the maternal morbidity.

Artificial rupture of the membranes combined with medical methods has many advocates. It is essential to drain off 10 to 15 ounces of liquor and apply a tight binder. Results are good in selected cases with regard to maternal and fetal morbidity and mortality; but the method fails even when combined with medical methods, and it is not universally suitable—for example, in oligohydramnios and in breech and "floating head" presentation. Schwartz, of Trinidad, writing to the *British Medical Journal*, stated that in over 700 cases he had used preliminary medical induction followed by artificial rupture of the membranes at the internal os without any ill effects on the mother or child attributable to the induction. His indications included toxæmia, disproportion, post-maturity and convenience of the patient and the doctor. He used the method from thirty-three weeks' gestation onwards with

unfailing success, and the average duration of labour was less than in natural labour.

High rupture of the membranes by Drew Smythe's catheter avoids prolapse of the cord, but has no other advantage.

The risks of insertion of bougies are infection of the uterus, perforation of the uterus, separation of the placenta and rupture of the membranes. The advantages of the method are that it preserves the sac of liquor. The success rate is 80% to 90%. Labour may begin only to cease if the bougies are withdrawn.

Gibberd reported 91% of success. The longest latent period was ninety-six hours and the shortest two hours, the average being thirty-five hours. In 40% it was less than twenty-four hours, and in 20% less than twelve.

Morton reported 87% successes with maternal morbidity rate 18.6%, maternal mortality rate 1.3%, and fetal mortality rate 4% (excluding operative deliveries).

Townend used bougies in 137 cases: for disproportion (in 82 cases), the fetal mortality rate being 8.5%; for maternal illness, the fetal mortality rate being 33.3% (including malpresentations) and the maternal morbidity rate 1.4%.

The disadvantage of hydrostatic bags is that the smaller bags may need to be replaced by larger bags after they dilate the cervix to their limit. The sizes vary from three to eight centimetres at the base. It is essential that the cervix be soft and easily dilatable and that the baby shall not have a large head. Complications are rupture of the sac, separation of the placenta, displacement of the presenting part with malpresentation, infection, and inadequate dilatation (the maximum is eight centimetres, whereas ten centimetres or more may be required for the head to pass). When the bag is expelled the membranes may be ruptured, with prolapse of the cord resulting.

Vorhees, using hydrostatic bags in 634 cases, reported that in 73 cases of *placenta prævia* the success rate of induction was 100%, the maternal mortality rate was 12.3%, the maternal morbidity rate was 23.3%, the fetal mortality rate was 20.7% (increasing to 57.7% if deaths within fourteen days were included). Thus induction of labour with bags is not a good method of treating *placenta prævia*.

Again, in 561 cases not including *placenta prævia* the induction was successful in 91.8%; the maternal mortality rate (moribund mothers excluded) was 3.9%; the maternal morbidity rate was 16.0%; and the fetal mortality rate (dead and non-viable fetuses excluded) was 8.6%.

Roble thought that the combined maternal morbidity in all types of inductions (25% compared with normal labour 10.5%) was due to the forcing of labour by the use of pituitary extract before the cervix, lower segment and uterus were prepared for labour. Laceration of the cervix was three times more common in morbid than in non-morbid cases. He said that the incidence could be reduced by the elimination of pituitary preparations. Morbidity was greater in proportion to the latent period and to the duration of labour; it was two and a half times as common in *primipara* as in *multipara*, and higher in those under twenty-five years of age, in cases in which bags and bougies were used, and when attempts to induce labour were made after spontaneous rupture of the membranes. It was lowest when induction was carried out within two days of full term and for convenience only. Private cases accounted for 10.2% of inductions against 0.8% of public cases; but he does not favour induction of labour for convenience, for post-maturity, or for cephalo-pelvic disproportion.

Dieckmann and McCready summarized the results obtained in 618 attempted inductions of labour, using a method involving stripping of the membranes at night and an enema in the morning, followed by either medical induction with pituitrin or surgical induction by artificial rupture of the membranes in some cases and insertion of an eight centimetre bag in others. They classed induction as "successful" if labour began not less than one hour or more than twelve hours later. There were 20 failures in the "pituitary" series, four after artificial rupture of the

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membranes and one after artificial rupture of the membranes plus the use of a bag and plus a course of pituitrin. The foetal mortality rate was 0.7% (corrected) and the maternal mortality rate 0.4%; the maternal morbidity rate was 19.4%. They considered a cervix to be "ripe" or ready for induction of labour if in a *primipara* there was complete effacement and dilatation of the cervix up to three centimetres, and if the margins were soft and half to one centimetre in thickness; whereas in a *multipara* effacement of the cervix was not necessary if the margins were soft and the dilatation was up to two centimetres or more.

Grier showed that the greater the effacement and dilatation of the cervix, the shorter were the latent period and the duration of labour; and also that the closer the head was to the level of the ischial spines, the shorter were the latent period and the duration of labour. Guttmacher and Douglas concluded that artificial rupture of the membranes was superior as a method to the use of bougies and bags because it had a higher percentage of success, a lower foetal and maternal mortality rate and a lower maternal morbidity rate, as well as a greater expectancy of spontaneous delivery within twenty-four hours.

CONCLUSION.

In conclusion I should like to see some standard method of "correcting" figures for induction of labour and to hear opinions on "ripe cervix" and induction.

Recently I ruptured the membranes in a *primipara* who had had two miscarriages. She was aged thirty-nine years and had hydramnios, "ripe cervix" and an engaged foetal head. Her expected date of confinement was May 18, 1948, and on that date she had a medical induction (castor oil, enema, pitocin) without a result. On May 19 I was asked to rupture the membranes, which I did at 2.40 p.m., without an anesthetic, draining much liquor. The procedure was followed by an intramuscular injection of three minims of pitocin every half hour for five doses. No uterine contractions followed. On May 20 the dose of pitocin was repeated, and only a few contractions occurred. On May 21 she had only a few irregular contractions; so a lower segment Caesarean section was performed at 4.45 p.m., when she was delivered of a living child weighing eight pounds fifteen ounces.

In this case, against successful induction of labour, in spite of the "ripe cervix" and full maturity, were the facts that the patient had come from the sterility clinic and had some anxiety about the outcome, having had two miscarriages; that she had hydramnios with overstretched uterus; and finally, that she was confronted with a stranger as obstetric surgeon at the last minute. Thus can nervous influences upset the best-laid plans under the best of circumstances.

TUMOUR REGISTRY.¹

By K. A. MCGARRITY, M.R.C.O.G.,
Sydney.

It is my privilege as tumour registrar to submit to this meeting on behalf of the New South Wales State Committee of the Royal College of Obstetricians and Gynaecologists this *questionnaire*, by which it is hoped to commence a central registry of gynaecological tumours.

Objectives.

Let me say briefly in explanation of this registry and its origin and objectives that Dr. F. A. Maguire first suggested its formation at the first meeting of the State committee last year. The objectives of this registry are: firstly, to provide machinery to collect data about all types of gynaecological tumours and to assemble those data in a manner which will allow them to be easily reproduced

at a later date; secondly, to provide a central bureau within the college which would be available to medical men who wished to conduct specific inquiry into any problem within the scope of the registry.

Method of Record.

In order to collect this information in a way that would cover a comprehensive survey of symptomatology, signs and laboratory examinations in each case, it was thought that a standard form should be used. As it is hoped that this *questionnaire* will be available in all hospitals and medical centres throughout the State and completed by men both within and outside the college, it was considered that such a standard form would be preferable to the casual history-taking of the individual doctor.

In order to ensure that this could be completed adequately and quickly, after consultation with many practitioners I decided on the present form with fixed and free answers.

The form of the fixed answers allows a permanent record to be made on a punch card system. This system is to be prepared by a Sydney firm of analysts, and I should like to pay tribute to their excellent cooperation.

The form has been the subject of many criticisms already, and one of them has been made that it is too long; but in a survey that has been made the average time taken to complete it fully was only seven to ten minutes. I feel that in planning it one has to look ahead and to make it comprehensive, and naturally in filling it in one need not complete many of the questions; the history can be made as short as the originator desires. Where further elaboration is required, the relevant sections in free answers—that is, history and clinical examination—provide scope for a more complete answer.

After the necessary information has been extracted onto the punch card the *questionnaire* will be given a registry number and filed in numerical order, and a cross index will be maintained in alphabetical order.

In this way, if one wishes to obtain the histories of women suffering from any gynaecological tumour occurring in a certain age period at a specific stage of parity, with certain signs and symptoms and coming from any wage-earning class, and living in any stated district *et cetera*, this may be done quickly by reference to the master card and by the application of the cards to the machine so that the relevant cards are extracted. From the registry numbers on these cards the histories can be traced quickly, or *vice versa*. The information required from any group of histories can be quickly given by extracting the cards.

In addition, as a last check, a register will be kept in alphabetical order.

Application.

The practical application of this scheme I envisage as follows. Firstly, all members and fellows will be given a supply of forms by the registrar. Secondly, representatives from the college will see that supplies of *questionnaires* are available at metropolitan hospitals on gynaecological operation days, and will stimulate a resident medical officer to fill these in and forward them to me. Thirdly, a notice will be inserted in the journals about the existence of this registry, so that hospitals and doctors throughout the State may cooperate in this effort to secure a representative collection of gynaecological data in one central bureau, which perhaps may in time justify its existence by the complete classified data that it will contain on any subject within its scope. This may perhaps allow further light to be thrown on problems associated with such tumours. This has been accomplished by the Registry of Bone Sarcomata in the United States of America.

Conclusion.

Finally, I should like to urge those who send in completed *questionnaires* to submit information on any of the more common gynaecological tumours, such as fibroid tumours and ovarian cysts, as well as on the rarer types of pelvic neoplasm.

¹Read at a meeting of the New South Wales State Committee of the Royal College of Obstetricians and Gynaecologists, held on May 28, 1948, at the Women's Hospital, Crown Street, Sydney.

PERSONAL ERRORS IN GYNÆCOLOGY.¹

By R. I. FURBER, F.R.C.O.G.,
Sydney.

HAVING been asked to speak this morning, I thought it would be a good thing to tell you of some of my more instructive errors.

Damage to the Ureter.

One of the bugbears ever present to gynæcologists is damaging the ureter, and although it took me a long time to injure one, I did it a second time for good measure. The first accident occurred while I was performing a hysterectomy for a large cervical fibroid tumour, and the second while I was removing large bilateral subperitoneal cystadenomata.

I have always collaborated very closely with the urologists, and in such cases I ask them to estimate carefully the renal function and to catheterize the ureters whenever this is possible. I say "when possible" advisedly, as catheterization may be extremely difficult, owing to the huge distortion of the base of the bladder, which sometimes makes the ureters inaccessible to the catheters and even invisible with the cystoscope.

In the first case I knew that pyuria was present and that the renal function was poor, and to add to the difficulties my old friend Dr. Reginald Bridge was unable to catheterize either ureter. Having to do without this aid, I was more than careful right up to the point where the whole tumour was freed but for the right infundibulo-pelvic fold; but there was not much fold about it, the tumour having lifted it up from the brim. I carefully examined the situation and was sure the ureter was not in this quasipedicle, and then just as carefully cut straight through it. I performed an end-to-end anastomosis over a ureteric catheter, which was removed in three days by Dr. Bridge. For five days a fair amount of urine was excreted; but then the patient developed almost complete anuria and died from uræmia.

A less frequent but more dangerous situation arises when a tumour—and then usually a paracervical tumour—in its development lifts the trigone and ureter up above it. In one case recently the left ureter and trigone were near the top of the tumour and wedged in the angle between the tumour and the uterus. Dr. A. C. Telfer had passed a catheter, and very fortunate that was, as I do not know how otherwise I could have sized up the situation. Even then the difficulties and dangers were more than enough. The commonest point of danger in cervical or paracervical fibroid tumours is just where the ureter reaches the tumour—that is, the part of the tumour closest to the infundibulo-pelvic fold. The tumour in its slow development peels the ureter off the posterior blade of the broad ligament and pushes it outwards and downwards. The most dangerous point is when the trigone itself is dislocated upwards. It is the tumour of slow development that causes most damage to the renal function, as is commonly seen when the ureters are involved in cases of cancer of the cervix.

On the second occasion I was operating on a patient with bilateral multilocular ovarian cystadenomata. The tumour on the left side was mainly subperitoneal; it dissected up the blades of the left broad ligament and the recto-vaginal septum and spread well out over the external iliac arteries. The ureters were catheterized by Dr. Telfer without difficulty, and this made them obvious all the time. The external iliac arteries made the operation interesting, and it was necessary to perform a total hysterectomy, largely from the opposite side, before I was able to go below the left tumour, which again was deep below the ureter. When the tumours were removed in one mass with the uterus, there was left a small bleeding point above the ureter, close to the bladder. This was picked up with meticulous care, and I was positive that I had done no harm to the ureter.

When the catheter was taken out, however, it was found to have been fractured, and Dr. Telfer, hoping for the best, reinserted it and removed it two days later. Urine

filled the operation space and an attempt at repair was made, which failed; the kidney had to be removed. Convalescence was then uneventful.

The capricious manner of growth in such dissecting cystadenomata displaces the ureter in any direction; but the main point of danger is deep in the parametrium and close to the bladder.

The moral is that in all cases of subperitoneal tumour the greatest care should be taken to investigate the renal function and to make full endeavour to catheterize the ureters prior to operation.

Damage to the Baby in Cæsarean Section.

Cutting the baby while performing a Cæsarean section would seem difficult, but I succeeded in achieving the feat.

The mother was extremely small and the father extremely large; the consequence was that the child was packed tightly in a much over-stretched uterus. The uterine wall was so thinned out that I completely under-estimated it, and cut the skin of the child's shoulder. The cut was sewn up; but unfortunately with the girl's growth the scar grew, and it has no doubt been extensively discussed on many a surf beach and elsewhere, to enlarge my reputation.

Since then I have always made a small incision in the uterus, sufficient to allow me to put my finger in down to the decidua or placenta and pass it down when performing a high section, or across when performing a lower segment operation. This procedure I have found of much value, not only in being sure that one does not cut the baby, but also because the uterine incision can be made boldly and cleanly onto the finger or a flat retractor or hernia dissector.

When the placenta is below the incision the plane of cleavage can be found and some separation begun; further separation is thereby made much easier, more rapid and more efficient.

The moral is that in performing a Cæsarean section a small opening should always be made into the uterus before the incision is extended to its full length, which should be about the length of an ordinary Spencer Wells forceps.

Secondary Hæmorrhage after Vaginal Operations.

Secondary hæmorrhage is not an uncommon happening after vaginal operations of any kind, and the common error in its control lies in packing the vagina. Packing does not control a hæmorrhage of any degree; the blood just seeps past till the time comes when blood transfusion may be needed and something has to be done about it. Such hæmorrhages always produce some degree of trauma of the operative field, usually of a gross degree, and this is only made worse by packing. The patient should be given an anæsthetic in the operating theatre, the bleeding point should be picked up under sight, and the opportunity should be seized to resuture, as may be found necessary.

Traction in Hysterectomy.

Recently I was operating on a woman for an extensive endometrial cancer, and had reached a stage where the cervix was well cleared in the anterior, right lateral and posterior aspects. In an endeavour to free the left side of the cervix well down the vagina, the body of the uterus came away in my hand; it was apparent then that it had the consistence of a rather gruesome Gorgonzola, without, however, the usual aroma, and a large lump of the fungating tumour fell onto the protecting pads. The further dissection of the tumour was difficult, but it was hard to say whether this difficulty had been increased by the accident. Convalescence was uneventful, maybe owing to fairly massive doses of penicillin; but whether the risk of recurrence had been increased I do not know.

This is an unpleasant technical happening, and it has made me remember since, as it is such a short time ago, not to make the slightest traction in dealing with similar tumours—although I thought that I had not done so on this occasion. It has happened to me twice before, many years ago, when I was dealing with cancers of the cervix in two patients, both of whom, remarkable to relate, are still alive.

¹ Read at a meeting of the New South Wales State Committee of the Royal College of Obstetricians and Gynæcologists, held on May 29, 1948, at Sydney Hospital.

The pathological report that the tumour was an extensive infiltrating adenocarcinoma and that mucopus was diffusely spread throughout the myometrium sufficiently explained the happening.

The moral is that though traction is the art of hysterectomy, it should be avoided when there is any doubt about the consistency of the uterus.

Conclusion.

The time allotted has limited me to these few scrappy remarks about errors of operative technique, and I have been unable to make any reference to my diagnostic errors, which are still only too frequent.

VAGINAL HYSTERECTOMY-COLPORRHAPHY.¹

By A. L. WATSON, M.R.C.O.G.,
Sydney.

By way of prelude I may say that up to nine or ten years ago I belonged to that group of gynaecologists who strongly and entirely denounced and condemned the operation of vaginal hysterectomy; but I must confess that during the past few years I have shifted ground quite a lot, until today I firmly believe that the operation of vaginal hysterectomy-colporrhaphy should occupy a definite and established place in gynaecology within a restricted field; I repeat, within a restricted field.

From the outset I wish to emphasize that I do not advocate that the operation of vaginal hysterectomy-colporrhaphy should supersede or replace or even compete with the Manchester operation. Each operation has, in my opinion, its own indications and contraindications, and each operation should be applied to a different group of cases. If a woman has an uncomplicated uterine prolapse, the Manchester operation is the operation of choice; it is a straightforward, extraperitoneal operation, easy of performance, and with good remote end results. But in some cases of complicated uterine prolapse, by which I mean the presence of a diseased or hemorrhaging uterus or the presence of an enterocele, the position is entirely different, because the Manchester operation, of course, does not remove the uterus and does not cure or prevent enterocele.

I think I should mention—although I realize that I am speaking to a meeting of specialists in gynaecology—that simple hysterectomy of any kind, whether abdominal or vaginal, will not cure uterine prolapse. Judging from what we read in some of our medical journals, the unwary person may easily be led to think that simple vaginal hysterectomy is a cure for uterine prolapse. I do not believe that it is. It is the colporrhaphy or reconstruction that follows the vaginal hysterectomy that will cure some types of uterine prolapse, not the mere extirpation of the uterus itself. I feel that this point has not been sufficiently emphasized in the literature, and I believe it is the lack of appreciation of this point which has in the past led to many disappointing and unsatisfactory results in some medical centres.

Contraindications.

There are probably more qualifications and contraindications attached to the operation of vaginal hysterectomy than to most operations.

The main contraindications are as follows. The first is a history of previous pelvic operations. When a patient has a mid-line lower abdominal scar, my advice is not to perform a vaginal hysterectomy, because of the possibility of adhesions, which may seriously hamper the operation. Secondly, ovarian tumours contraindicate vaginal hysterectomy. Thirdly, large fibroid tumours should be removed by the abdominal route, and no attempt should be made at vaginal removal by morcellation or bisection of the uterus

as recommended by some. I do not perform vaginal hysterectomy if the fibroid tumour is larger than a cricket ball or even if a small fibroid tumour is subvesical or intraligamentary in position, owing to the danger of trauma to the bladder and ureters. Fourthly, a history of pelvic pain, which may indicate the presence of tubo-ovarian disease or endometriosis, contraindicates the operation, again owing to the possibility of adhesions. Malignant disease and pregnancy are of course two other contraindications.

A thorough and accurate vaginal examination is a pre-operative essential; otherwise the surgeon may find himself in serious trouble during the course of the operation.

Pre-Operative Preparation and Post-Operative Care.

These are two major and vital factors in this operation. The former is that the operation shall be performed through a well-cleansed and disinfected vagina. The latter concerns chiefly the drainage of the bladder by an indwelling catheter for three days, and then daily catheterization to remove residual urine.

Vaginal hysterectomy-colporrhaphy demands more nursing care than abdominal hysterectomy, and unless skilled and adequate nursing is available the operation should not be performed.

Technique.

I use three varieties of technique. All are based on the Manchester principle—that is, shortening of the cardinal ligaments. Any technique not using the Manchester principle is, in my opinion, destined either to complete failure or to only partial success.

In an extensive search of the literature I cannot find a description of any method employing cardinal ligament shortening in the operation of vaginal hysterectomy for prolapse since that described by Mayo in 1915. Whereas Mayo's technique everts the divided ends of the cardinal ligaments, the technique used by me inverts them. Mayo's technique leaves a large hiatus behind the tied cardinal ligaments and therefore an enterocele sometimes follows. The technique I employ aims at eliminating this weakness by dissecting up and raising the peritoneum of the pouch of Douglas and plugging this area with the infolded ends of the utero-sacral and cardinal ligaments. This forms an effective barrier to enterocele.

Many other techniques are described in the literature; the basis of most of these is the lateral fixation of the pedicles of the broad and cardinal ligaments into the angles of a transverse incision in the vault of the vagina. I have no confidence in these methods, because they are not based on the Manchester principle of cardinal ligament shortening; in these methods apparently the vaginal vault depends for its support on the round ligaments; in my opinion this is insufficient and would in time allow the vault to sag.

The following are the three techniques used by me.

First Technique.

The first is used for benign disease of the uterus or enterocele plus first-degree uterine prolapse with or without cystocele and rectocele.

The operation is commenced in the ordinary way for anterior colporrhaphy, the bladder being separated from the vaginal wall and the uterus and the peritoneum of the utero-vesical pouch incised. Excess flaps are excised and the incision is continued around the cervix posteriorly and the peritoneum of Douglas's pouch is opened. A forceps then grasps the utero-sacral and cardinal ligaments on one side close to the cervix, the ligaments are severed and a catgut suture is inserted; the procedure is repeated on the other side, and by successive suturing on either side towards the fundus the uterus is removed.

The peritoneum of the pouch of Douglas is then dissected from its bed and laterally to the level of the utero-sacral ligaments.

In the reconstruction the pubo-cervical fascia is approximated in the mid-line, and then from the meatus the anterior vaginal wall is sutured by interrupted chromicized catgut sutures. One suture, usually about half-way along

¹Read at a meeting of the New South Wales State Committee of the Royal College of Obstetricians and Gynaecologists, held on May 29, 1948, at Sydney Hospital.

the anterior incision, picks up the two round ligaments and the peritoneum of the bladder and the pouch of Douglas; the last suture, high up in the vault, not only approximates the vaginal wall edges, but also turns the ends of the cardinal ligaments by a "bite" about three-quarters of an inch from the cut ends.

The posterior colporrhaphy is commenced from above as a continuation from the anterior incision, the vaginal wall of the posterior fornix being incised in the mid-line. In the suturing of this incision particular care is taken to include a "bite" of prerectal fascia in each suture. The posterior colporrhaphy is then completed from below, together with a thorough union of the levatores ani and a perineorrhaphy.

Second Technique.

The second technique is used for benign disease of the uterus or atrophy of the uterus or enterocele, plus second or third-degree uterine prolapse with or without cystocele and rectocele. I restrict this technique to women aged over thirty years who are not interested in coitus.

The technique is similar to the first, except that greater lengths of the cardinal ligaments are inverted. In the presence of procidentia, successive infolding sutures will have to be inserted in the cardinal ligaments until the last one approximates the ligaments fairly tautly inside the vagina, usually about two and a half inches up. If it is possible to tie this last suture at the vaginal orifice or even just inside the vagina, the operation will not be successful; therefore, more inverting sutures still must be inserted until the ligaments are lifted well up into the vagina; this is the vital point in the technique.

This technique leaves the patient with a shortened vagina about two and a half inches long, but the operation is satisfactory—in my opinion even more so than the Manchester operation when used for prolapse accompanied by an atrophied uterus.

The patient must of course understand that complete coitus will not be possible after the operation.

Third Technique.

The third technique is used for benign disease of the uterus or enterocele plus third-degree uterine prolapse or procidentia. With this technique the full length of the vagina is preserved.

When the uterus has been excised the tied ends of the utero-sacral and cardinal ligaments are turned back deep into the pelvis, each pedicle being sutured with silk to the sacral end of the utero-sacral ligament of the corresponding side, lateral to the rectum and beneath the raised peritoneum of the pouch of Douglas; another silk suture unites the cardinal ligaments in the mid-line immediately in front of the rectum.

The pubo-cervical fascia and the anterior vaginal wall are sutured as before, but posteriorly the edges of the anterior vaginal wall are sutured to and beneath the united cardinal ligaments as far back as the rectum.

A high posterior colporrhaphy and perineorrhaphy are carried out as in previous techniques.

This operation is made possible by the great length of the cardinal and utero-sacral ligaments. It eliminates the possibility of enterocele by plugging the denuded pouch of Douglas. However, the technique has two disadvantages: firstly, it is rather a difficult operation to perform, and secondly, it is time-absorbing. I do not think that it can be completed in less than ninety minutes. On the other hand, for a patient who needs hysterectomy and has a uterine prolapse, the two conditions are dealt with in one stage, whereas if they were dealt with separately there would be two anaesthetics, two operations, two risks and twice the number of days in hospital.

Comment.

There is another group of patients, and a fairly large group, who have a diseased uterus and a second-degree uterine prolapse, in whom it is essential to preserve the full length of the vagina. In these cases the cervix presents at or just outside the vaginal orifice. I cannot recommend vaginal hysterectomy-colporrhaphy for this group, as the cardinal ligaments in these cases are too long

for the first technique and too short for the third technique. In these second-degree cases, if any attempt was made to suture the cardinal ligaments back forcibly, as in the third technique, I fear that the tension would be too great and there would be danger of kinking of the ureters. The Manchester operation followed by abdominal hysterectomy two weeks later is therefore recommended for this group. Some gynaecologists do recommend vaginal hysterectomy for these second-degree cases; but, as I have said before, I cannot bring myself to agree with their technique.

Summary.

The following, then, are the six steps of the operation:

1. Excision of the uterus. This is the easiest part of the operation and should not give any trouble at all, provided the contraindications have been strictly observed.
2. Dissection of the peritoneum of the pouch of Douglas. Dissecting up this peritoneum is an easy procedure; occasionally, however, bleeding from the hæmorrhoidal vessels is troublesome, but it has never given me cause for anxiety.
3. Inversion and suture of the cardinal and utero-sacral ligaments. This is the essential and vital step of the operation, and unless it is efficiently performed the prolapsus may recur.
4. Suture of the pubo-cervical fascia. As in the Manchester operation, the suture of this fascia gives firm support to the bladder.
5. Suture of the anterior vaginal wall. This is simply a routine step, with the incorporation of the two round ligaments and the free ends of the pouch of Douglas and bladder peritoneum in one of the sutures.
6. High posterior colporrhaphy and perineorrhaphy. This also is a routine step; the posterior incision is continuous with the anterior incision. No transverse incision in the vault is used.

Conclusion.

In conclusion I can confidently say that I have never been sorry for having performed a vaginal hysterectomy; looking back, I have sometimes been sorry that I did not.

A BRIEF SURVEY OF THE TREATMENT OF OSTEOARTHRITIS OF THE HIP.¹

By R. D. McKELLAR HALL, F.R.C.S. (Edinburgh),
F.R.A.C.S.,
Perth.

This paper is intended to give only a brief résumé of the situation in regard to the treatment of osteoarthritis of the hip. The whole subject will be covered in detail by succeeding speakers, and so I feel that although a rapid enumeration of the multitudinous methods of treatment will no doubt prove somewhat boring, this is essential for our purpose and I hope it may be possible to introduce some food for thought.

I have not considered it necessary to commence further back than about 1912 when A. H. Tubby rewrote his magnificent treatise on "Deformities, including Diseases of the Bones and Joints", first published in 1896. Therein he devotes many pages to arthritis and its treatment, and it is interesting to note that conservative treatment was then carried out on the same general plan as at the present time, the only differences being related to refinements in technique and modern advances in physiotherapy and electrotherapy, whereas major operative methods were dismissed as not worthy of consideration except in the presence of a few well defined indications.

When a patient with osteoarthritis of the hip consults us it is first necessary before planning any course of treatment to provide ourselves with quite a lot of informa-

¹ Read at a combined meeting of the Section of Orthopaedics and Physical Medicine and the Section of Radiology and Radiotherapy, Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

tion apparently unrelated to the actual condition of the hip joint; in other words, the patient must receive more attention than the disease. It is necessary to consider in detail the patient's age, physical condition, occupation, economic state, the necessity or otherwise for continuation in employment, and the nature of his employment. This applies equally in conservative and operative methods. It is necessary, too, to emphasize the fact that the vast majority of patients have come because of pain, very few because of the disabilities following upon restricted mobility of the hip joint.

Hence, my own practice is to concentrate on the problem of relief of pain rather than on the more spectacular but much more uncertain one of restoring movement, which must be painless, in the hip joint. In order to tackle this problem we must have some idea of the cause of the pain in osteoarthritis of the hip, and this is somewhat of a mystery. Some authorities consider it originates mainly in the capsule and have planned extensive capsulectomies or complete extirpation of the capsule for its elimination. Herman G. Gade of the University Clinic, Oslo, quoted in "The 1947 Year Book of Orthopaedic and Traumatic Surgery" (page 142), followed up eight out of 12 patients on which he had performed this operation (1933-1946) and reports that all had complete relief from pain, 21% gaining increased functional mobility, and that no contractures or instability resulted.

Tubby implied (I do not know that he actually stated it plainly) that the pain originates within the joint when he wrote:

The second point is to endeavour to diminish the pain within the joint, itself a cause of reflex contraction, and to lessen the irritation due to the contact of inflamed and denuded surfaces of bones.

And finally, Kaplan of New York in a recent article on obturator nerve avulsion in the treatment of painful hip joints makes the following three statements:

It is obvious at the present time that from the viewpoint of anatomy many questions pertaining to the nerve supply of the hip joint are unanswered.

A review of the special literature concerning the nerves supplying the capsule, the synovia, the hyaline and fibrocartilage shows how very little precise information can be obtained.

The conclusion to which one arrives pertaining to nerve endings in the joint structures and to the pathways which carry painful stimuli to the central nervous system are quite indefinite.

Now let us survey briefly the various methods of treatment, dividing them into conservative and operative. Let us commence with Tubby's views of 1912, and I quote him only as a distinguished representative of that period, and because his principles, in the main, still hold good today. Proud of our own attainments, it is sometimes a chastening exercise to renew our acquaintance with the methods employed by the giants of the past. We find that Tubby advocated attention to general health as these patients are mostly aged and prone to degenerative conditions of the internal organs; a dry climate; visits to the various spas to take the waters and enjoy the pleasure of mud baths, radioactive or otherwise, douches, massage *et cetera*; regulation of diet; elimination of defects of metabolism and sources of toxemia; administration of medicines of all kinds, especially the still useful though seldom prescribed "Chelsea pensioner". All these methods are as valuable today as they were in Tubby's time, and moreover are often overlooked by many of the enthusiastic mechanically minded surgeons of our era.

He advocates rest in the active painful stages and movement within the limits of fatigue; and for the relief of pain the application of heat, by means of hot salt or sand packs, kaolin plasters and the electrical methods known in his day—electric light baths (100 sixteen candle power lamps regulated by a dimmer, ice packs being used to keep the patient's head cool!) and swaying heat from a 500 candle power globe. Short wave apparatus had not attained the prominence and utility it now possesses, and so we may add to his repertoire diathermy, inductothermy, infra-red rays *et cetera*, massage and movements judiciously controlled. All these physical methods and their indications will no doubt be discussed in a paper to follow.

Proceeding onwards Tubby's routine was briefly as follows. As some of the deformity is considered to be due to changes within the joint and some to extraarticular contractions from long continued malposition, an X-ray photograph is taken to ascertain the condition of the joint and the size, nature and position of the obstruction. If changes are slight and appear insufficient to account for the limitation of movement, one reexamines the limb and finds perhaps that the adductors are very taut; section of them often permits painless abduction to 30° or 40°. Therefore, he states, the first procedure is to overcome the contractions of the muscles, tendons and fascia by weight extension, tenotomy and myotomy.

Secondly, one should diminish pain in the joint, which leads to muscular spasm and joint fixation, and lessen the irritation caused by contact of inflamed and denuded surfaces. No forcible attempts to increase movement should be made, since they always make it worse.

The next step is to administer an anesthetic; (a) to ascertain the range of movement after eliminating the restriction due to muscular spasm, (b) to permit of division of shortened structures, and then (c) to ascertain by gentle manipulation the range of movement now permitted. This is followed up with weight extension to diminish friction. After several weeks and when pain has diminished and movements have increased, ambulation is instituted in a Thomas caliper knee splint with a pelvic band and locking joint which allows movement within the painless range of the hip.

There are other methods which we have not yet dealt with adequately. Let us begin with manipulation. I quoted Tubby a short while ago as stating that no forcible attempts should be made to increase movement. With that statement I am not quite in whole-hearted agreement, for I think that manipulation plays a useful part in treatment in the early stages if there is no obvious evidence of toxic activity, although I confess that I cannot lay down precise indications for its use.

Intraarticular injection of certain solutions (and maybe in the case of the hip joint this includes periarticular injection, for at least one advocate of this method does not seem to mind much if the injection does not go into the joint) has been championed of recent years by Grant Waugh and Warren Crowe, who have been using lactic acid and procaine, and potassium acid phosphate respectively, and Warren Crowe has recently added magnesium acid phosphate. The rationale and *modus operandi* of these methods have not been explained to my satisfaction.

Deep X-ray therapy has its advocates and I have found it extremely useful. I leave it to others to lay down the specific indications, for frankly my experience is not large enough for me to determine exactly which type, whether early or late, those with gross radiological changes or those without, responds best—I have had successes with both types, and failures too.

I doubt if immobilization in plaster of Paris is as good as weight extension, but it is employed extensively by some.

As regards operative treatment there are many methods, as you are all aware, and you are to hear later from Dr. John Hoets on this matter. I must apologize for intruding on his preserve, but I must briefly mention some of the methods which may not be referred to in his paper. I have already mentioned capsulectomy as performed by Gade of Oslo. Obturator nerve section or avulsion has been performed fairly frequently on the continent of Europe and in America with favourable results. It is a minor operative procedure and, so far as I am aware, produces no ill effects—no muscle weakness, for example—but on the contrary in about 60% of cases it brings about considerable relief from pain.

In 1936 Young of Glasgow advocated ganglionectomy for the relief of pain and muscular spasm, quoting a case of advanced osteoarthritis of the hip in which left lumbar ganglionectomy and trunk section had been performed with exceptionally good result. I have not heard any rumours of this procedure's becoming very popular, but it does demonstrate that the methods of treatment are legion.

Before leaving this field to Dr. John Hoets, let us return to Tubby. Intraarticular interference, he states, is rarely justifiable. If carried out with the object of removing bony outgrowth, except the smallest, it is far from satisfactory. He advocates removal of a loose cartilage in the knee joint if it is aggravating the swelling and pain; this is somewhat difficult to determine at times. Whereas a distinguished orthopaedist has recently advocated just the opposite, my own small experience agrees with that of Tubby. But we are off our course. Tubby has on two occasions seen in the X-ray film an osteophyte pressing on the sciatic nerve and recommended removal. Unrelenting pain in the hip may force us either to excise the hip or to undertake an osteoplastic operation (he quotes Robert Jones). He also mentions Albee's arthrodesis, and there he stops.

We know what great strides have been made in the study of arthroplasty since Tubby's day, and it is now hardly possible to remember many of the large variety of operations designed to restore mobility at the hip joint. Then there is McMurray's osteotomy with the variations introduced by many surgeons.

It is very difficult to know what is best done for any individual patient. Illustrating this aspect of the problem I will recall the case of a stocky, tough old farmer, small of stature, who had bilateral painful pseudo-ankylosis of both hip joints in an adducted and slightly flexed position. He reported only because the pain on working was "getting him down". How he managed I do not know. I toyed with the idea of an arthroplasty on one hip, but he expressed firm views on getting back to his farm as soon as possible as he was still an active worker, and so I performed a McMurray osteotomy first on one side then on the other. Some three or four years later he turned up again beaming all over. "Last time you cured them, now make them move", he said. On my explaining the doubts, difficulties and uncertainties of arthroplasty he went away quite happy, saying that he could do his farming now without pain and so guessed he could go on doing so with certainty and had better be satisfied with what he had.

Although I admire the ingenuity displayed in the designing of false hip joints and the enthusiasm and zeal in the carrying of the designs into execution, I nevertheless myself adhere to the belief that the simpler, less risky and less incapacitating the measures employed, the more satisfactory on the whole is the result.

I do not pretend to have done anything but skim lightly over the ground allotted me, and even then only in a most perfunctory manner, and recall to your minds a few of the methods of treatment advocated by men of sound judgement and standing in this particular department. I join with you in the realization that the solution of the problem is not yet entirely within our grasp and in the hope that the future will eventually show us the way to a brighter and more permanent outlook for our patients than I feel is their portion today, however much we may pride ourselves on the truly great progress we have made.

OSTEOARTHRITIS OF THE HIP: TREATMENT BY PHYSICAL MEASURES.¹

By B. G. WADE,
Sydney.

General Treatment.

COMBEE states:

One cannot produce complete healing and restitution of anatomical contour of degenerative hip disease by any known method of treatment.

Although the condition cannot be cured, much can be done by physical measures to relieve the pain and improve the walking of the sufferers. Normally the weight of the

body is borne at the hip joint by the central part of the head of the femur in its contact with the strong upper part of the acetabulum. In degenerative hip disease, forward inclination of the pelvis always occurs, resulting in muscle action which is less efficient, both for stability of the joint and for locomotion.

Pain is a constant symptom and is due to the associated muscle spasm and fibrositis of the muscles, mainly the *gluteus medius*. Wasting of the gluteal muscle always occurs, accompanied by adduction, external rotation and flexion of the hip joint.

The first procedure in treating osteoarthritis of the hip is to correct bad posture which causes faulty weight distribution. This is most frequently due to flat feet. Appropriate foot and posture exercises should always be given in conjunction with any direct treatment of the hip itself.

Working conditions must always be investigated and modified, or altered where necessary.

Exercises must be regulated and a rest period of one hour a day insisted upon. When flexion deformity is present, this rest period should be spent prone, with one or more pillows under the abdomen. By gradual removal of the pillows, the leg is slowly straightened by stretching of the anterior structures. Extension may be applied to the lower limb with the patient recumbent on a firm mattress. This relieves the muscular spasm and diminishes pain. It has been noted that, when extension was being applied to a leg to give more space for injection into the joint, the pain was relieved by the extension alone before any injection was given.

Obesity is very common in these patients and must be corrected by a diet of low caloric content (1200 to 1500 Calories) supplemented by desiccated thyroid under watchful medical oversight.

Local Treatment.

There is frequently spasm of the *gluteus medius* muscle, and a common site for fibrositic nodules is along the *gluteus medius* tendon. These myalgic spots can usually be found on deep pressure medial to the great trochanter. Much of the pain is due to this associated muscle spasm and fibrositis. Injection of procaine into this area usually gives great relief. General infiltration of the joint capsule with procaine is not nearly so successful in the hip as in other joints.

Osteoarthritis can be counteracted only by a powerfully reinforced blood and lymph supply. This can be best accomplished by the administration of short wave therapy for twenty to thirty minutes at maximum toleration by the patient. This application of short wave therapy may be repeated twice a day if necessary. Owing to the depth of the hip joint and the large pads of muscle and fat overlying it, short wave diathermy is the only method of adequately heating the joint itself. It is safer and more comfortable for the patient to use the induction cable wound in the shape of a pancake coil over the joint, or the curved drum round the hip with the patient lying on the side. The use of the condenser field two-pad method is dangerous, as the weight of the body on the underneath pad causes anaemia of the skin in the area with increased likelihood of a burn, due to the diminished circulation. Furthermore, the pressure on the pad is uncomfortable to the patient and only much lower intensity of heat can be used. Infra-red and radiant heat cradles do not allow penetration sufficient to cause any heat in the joint capsule.

Local counter-irritation over the joint can be produced by histamine iontophoresis. A 2% histamine ointment is first rubbed into the joint, and an electrode covered by a moist pad is connected to the galvanic battery placed over the area. The dispersive electrode can be placed anywhere on the body. A current of five to ten milliamperes is passed for fifteen minutes. This produces intense hyperaemia and weal formation.

Another method of producing counter-irritation is by playing a shower of fine sparks over the area from a vacuum electrode connected to the Oudin terminal of the long-wave diathermy machine. If the pain and flexion deformity do not subside, a plaster spica may be applied

¹Read at a combined meeting of the Section of Orthopaedics and Physical Medicine and the Section of Radiology and Radiotherapy, Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

to the hip. Better results seem to be obtained if one method of heating is not persisted with too long. Change from short wave to histamine, to the vacuum electrode, and back again.

Massage, next to short wave diathermy, is the treatment *par excellence*. For the anterior part of the capsule to be reached, the leg must be flexed, abducted and laterally rotated, and deep friction applied transversely across the fibres of the capsule. The posterior part of the capsule is reached by deep pressure one and a half inches medial to the upper edge of the greater trochanter. General stimulatory massage is also given to the wasted gluteal muscles and adductors of the thigh. Massage is followed by gradual mobilization of the joint, the principal movements being extension and medial rotation. When X-ray examination shows much osteophytic lipping of the acetabulum, deep massage must be applied with caution, as heavy pressure against the osteophytes may cause trauma.

Exercises should be non-weight-bearing and designed to overcome the flexion deformity.

1. For abduction and internal rotation the patient lies recumbent with the knees straight and toes pointing inward, the legs are then separated laterally.

2. The hips and knees of alternate legs are fully flexed.

3. In extension from the face-down position, the thigh is lifted off the bed; or alternatively from the standing position with the trunk straight—the thigh is moved backwards.

4. The patient stands erect and swings the afflicted leg through a complete circle.

5. The patient stands erect and lunges forward with the affected leg—the straight "fencing position".

Above all, the patient should be encouraged to believe that he will not become completely crippled and bed-ridden and that a great deal can be done for him to relieve his pain and increase his movement by appropriate and continued physical methods.

The injection treatment of the osteoarthritic hip with a buffered lactic acid solution is, I understand, being dealt with in a separate paper.

THE TREATMENT OF ANKYLOSING SPONDYLITIS AND OSTEOARTHRITIS.¹

By F. DUVAL,
Sydney.

X RAYS have been used for the treatment of diseases of bones and joints almost from the time of their discovery, but many of the early treatments varied considerably in their dosage and technique so that results were difficult to judge correctly.

In the last ten years improvement in apparatus and accuracy in measurement of dosage have enabled a better idea to be obtained of the efficacy of deep X-ray treatment in these conditions. I propose to discuss today the value of deep X-ray therapy in ankylosing spondylitis, osteoarthritis and calcification in the region of the shoulder joint.

Ankylosing Spondylitis.

Ankylosing spondylitis is a disease which at one time was considered a rarity. This was due in great measure to the fact that the clinical and radiological features of the advanced stage only of the disease were described in the text-books. This was the stage of the "bamboo spine" when little or nothing could be done for the patient.

In recent years the early stages of the disease are being recognized and it is found that the condition is not uncommon.

The early symptoms are pain in the back and hips, often intermittent, but sooner or later the pain becomes localized to the lumbar region. Associated with this, there is increasing stiffness of the spine and some deterioration in general health. These long-continued symptoms in a young man should always arouse suspicion of ankylosing spondylitis. The blood sedimentation rate is usually raised.

An X-ray examination at this stage will show blurring of the sacro-iliac joints with some sclerosis of the adjoining bone.

Pressure over the sacro-iliac joints will often cause pain. Examination also reveals loss of the normal lumbar curve and restriction in movements of the spine, particularly flexion and extension.

As the disease advances the bodies of the vertebrae become sharp and the common ligaments begin to ossify. The hip joints may also become involved, a fact shown early by a narrowing of the joint space. The sacro-iliac joint space is often completely obliterated.

Clinically the patient at this stage will show muscular wasting, great limitation of movement of the spine, poor chest expansion and often a well-marked kyphosis.

Further advance of the disease may result in complete ankylosis of the spine, often in a position of great deformity with a flexed and almost immobile neck. It is at this stage that the X-ray appearances are those of the "bamboo spine" with complete ossification of the common ligaments.

The rapidity of the progress of the disease varies greatly. In some cases it runs a rapid course to complete ankylosis. In others it progresses slowly over many years. The average age of onset of the disease is in the middle twenties, and males are predominantly affected.

The prognosis for these patients has been completely altered by the introduction of deep X-ray therapy. There is little doubt that, if treated in the early stages, the disease can be arrested.

However, I wish to make it quite clear that, although deep X-ray therapy is the first step in the treatment of this condition, it is by no means the only one. The best results are not obtained by irradiation alone, but in combination with care of the general health and orthopaedic treatment and exercises designed to prevent and correct deformity. At the Middlesex Hospital in London where a large number of ex-service patients were treated for the Ministry of Pensions, every patient, after his preliminary course of deep X-ray therapy, was sent on to the orthopaedic department for advice and treatment if necessary. He was also instructed to report back to both clinics at regular intervals after treatment had been completed.

The striking feature of irradiation therapy is the relief of pain and to a lesser extent of stiffness. The exact mechanism by which this is brought about is at present unknown. The relief of pain enables exercises to be performed which previously were impossible, and for this reason most patients were treated by deep X-ray therapy before their exercises were commenced.

In addition to symptomatic relief there is also an effect upon the course of the disease shown by a fall in the blood sedimentation rate and an improvement in the general health.

The best results are obtained from intensive irradiation to the spine with narrow fields about ten centimetres wide. As the disease probably affects a large part of the spine, even in the early cases there is a good deal to be said for irradiation of the whole spine even when radiographically there is sacro-iliac involvement only. A method which has yielded good results is treatment of the spine and sacro-iliac joints by daily doses of 200r to 400r until a skin dose of 2000r has been given. One or two fields a day in turn are treated, and the whole is completed in about one month. The skin reaction is mild, reaching dry desquamation at the most, and irradiation sickness is usually not severe; it can be controlled by injections of pyridoxine or vitamin B complex. The medium voltages in the vicinity of 200 kilovolts with a filter of one millimetre of copper and one millimetre of aluminium appear to be the most effective.

¹Read at a combined meeting of the Section of Orthopaedics and Physical Medicine and the Section of Radiology and Radiotherapy of the Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

With this method symptomatic and clinical improvement can be obtained in almost 80% of cases, and this improvement can generally be maintained by proper orthopaedic care.

If a relapse occurs, further treatment by deep X-ray therapy can be given to the area affected, but the dose given should be lower, not more than 1200r to 1500r, and usually it is inadvisable to give it less than six months after the first course.

Many patients, however, with early ankylosing spondylitis treated over six years ago have shown complete arrest of the disease symptomatically and radiologically.

An alternative method of treatment which also gives good results is by smaller skin doses of the order of 1200r over about ten days, given only to the areas in which pain is present. This method appears more suitable for the advanced and moderately advanced case in which relief of pain is the desired effect.

The results of deep X-ray therapy then in the early case are an improvement in general health and movement and relief of pain. In a large proportion of cases the disease can be arrested.

In the moderately advanced case the results are less dramatic, but the general health is improved and there is relief of pain with some increase in movement which can be maintained by orthopaedic care.

In the advanced case little can be hoped for in the majority of instances, as by the time the spine has ankylosed most of the pain has gone. However, in the few cases in which pain is present this responds well to irradiation.

It is essential that after treatment all patients be kept under constant supervision in order to ensure early treatment of any recurrence of symptoms and to prevent or control spinal deformity.

The early stages respond so well to treatment that recognition of early symptoms and radiological signs cannot be overstressed. The arrest of the disease depends on early diagnosis.

Osteoarthritis.

Almost all individuals over the age of fifty years have radiological evidence of osteoarthritis, but only a small percentage of these have symptoms of the disease. It will be found that when symptoms do occur the X-ray appearances do not necessarily run parallel with the severity of the symptoms. For example, a patient may complain of pain in the hip of quite recent origin and an X-ray film reveal marked loss of cartilage and deformity of the acetabulum and femoral head with numerous osteophytes, all of which indicate that the disease is of long standing. During the greater part of this time no symptoms have been present. On the other hand severe pain may be present with minor radiological changes.

Pain and disability then appear, to a great extent, to depend on the condition of the soft tissues of the joint. The relief of pain which follows X-ray therapy can be explained by its power to bring about the absorption of excess fibrous tissue. This can be compared to the action of X rays on keloids of the skin, in which a gradual flattening and absorption take place after X-ray therapy, so that a thick, indurated and painful keloid may become a supple and painless scar.

Successful treatment of a painful osteoarthritic joint by deep X-ray therapy will give relief of pain, muscle spasm will be lessened, and in that way the range of movement in the joint will be increased, although radiologically no change may be visible. The relief of pain which follows treatment varies considerably in its degree, in the time at which it occurs and also in its duration.

Occasionally a dramatic effect is obtained after one or two treatments, and this improvement may be maintained for years. More commonly improvement begins within a week or so of the completion of the course and gradually increases to its maximum within a month. If there has been no improvement within two months after treatment it is unlikely to occur at all with that dosage, although improvement may follow a further course.

The duration of relief of pain is even more variable. Some painful joints respond early to irradiation and the good effect may last for years. More commonly there will be lessening of pain or even complete freedom for periods from six months to two years, when symptoms begin to return, although they may never be as severe as before treatment. A further course may or may not give good results the second time; usually it does.

Perhaps the most disappointing cases are those in which, after an initially excellent result, there is a return of pain within a month or six weeks and further treatment is ineffective. Perhaps about 10% of patients come into this group.

It is impossible in many cases to decide why failure has occurred. Excessive weight is often an important factor, but often no obvious reason can be found.

There is also a difference in the results of treatment of the various joints. In the spine the treatment produces satisfactory results in a greater proportion of cases than in the hip or shoulder joints, and the knee joint appears to respond least well.

The method of treatment to be adopted varies with each individual. In general a medium voltage of 200 kilovolts is used with a filter of one millimetre of copper and one millimetre of aluminium, and the aim is to deliver a dose of between 600r and 1200r to the affected joint in about two weeks.

In the spine a narrow field (about eight centimetres wide) is used varying in length from 10 to 20 centimetres according to symptoms and radiological appearances. It is advisable to start with a small dose such as 200r to the skin and later to increase the dose gradually. The reason for a small dose is mainly to avoid irradiation sickness, which can be troublesome with spinal irradiation, but also because occasionally exacerbation of symptoms may follow the first treatment. Treatment is given every day or every second day and a skin dose of 1000r to 1600r is given according to the condition and response of the patient.

In the hip joint and knee joint two opposing fields are employed, and one is guided by the dose to the joint itself rather than by skin dose. Usually five or six treatments are given to bring the dose to about 1000r.

In some of the Continental clinics higher doses are given, often 2000r to the joint over two weeks; by this method it is claimed that the percentage of relapses is less, and the dose is not so high as to contraindicate a further course should it be necessary. However, the results do not appear to be much superior to those of the more conservative technique.

It is difficult to give accurate figures of results owing to the great variation in the clinical forms of osteoarthritis. In broad figures perhaps 70% of patients give an initially good response and 30% either do not respond or respond for a short period only. Of the 70% who give an initially satisfactory response perhaps half will maintain the improvement for months or years. Deep X-ray therapy has much to commend it in the treatment of osteoarthritis. Few treatments are needed, which should not cause the patient much inconvenience, and although the response is difficult to predict, a reasonable percentage of good results is obtained. If X-ray treatment fails it has in no way interfered with any subsequent forms of treatment which may be considered.

Calcifications in the Region of the Shoulder Joint.

By far the most common cause of a painful shoulder is subdeltoid bursitis. There are many synonyms for this condition, including periarthritis, peritendinitis, subacromial bursitis and calcification of the spinatus tendon.

All these names are used to describe a painful condition of the shoulder associated with inflammation of the subdeltoid bursa and changes in the tendons in proximity to it.

Calcification is frequently found in these areas, most commonly in the supraspinatus tendon, less frequently in the bursa itself. On the X-ray film the calcification varies considerably in area and position. The deposits may be single or multiple and range in size from 0.1 to 3.0 centimetres. Most commonly they are found above the greater

tuberosity. About 50% of cases of subdeltoid bursitis show some radiological evidence of calcification.

The symptoms vary with the clinical stage of the disease. The acute type may be sudden in onset and the pain is often extremely severe. The pain is aggravated by movement and tends to radiate along the arm. There is usually some tenderness over the greater tuberosity.

In subacute and chronic subdeltoid bursitis the symptoms are similar but less severe, namely, pain in the shoulder with limitation of movement. The pain is often worse at night, so that the patient cannot sleep on the affected side. Examination will often reveal wasting of the deltoid muscles, due to disuse, and tenderness usually limited to a small area above the greater tuberosity.

There appears to be no relationship between the appearance and size of the calcareous deposits and the severity of the symptoms.

Many methods have been used in the treatment of this condition, ranging from conservative measures, such as rest and heat, to surgical removal of the calcareous deposits. Good results have been reported from all these methods.

The value of deep X-ray therapy in treatment lies in the fact that in acute stages of the disease relief is very rapid and restoration to normal may be reached within a fraction of the time required by other methods. In the majority of cases of acute disease treated by deep X-ray therapy the symptoms have completely subsided within one week.

The response to treatment is greatest in the acute stages, in which the condition of about 90% of subjects returns to normal in a short space of time. The subacute conditions respond more slowly and the percentage of cures is slightly lower. Of the chronic conditions about 50% yield poor results from irradiation alone.

Besides the relief of pain and restoration of movement there is nearly always rapid absorption of the calcareous deposits. This absorption may be complete within a few days or weeks, and recurrence is rare.

The method of treatment by deep X rays will depend upon the severity of the disease and the conditions available for treatment. If the patient can travel without undue discomfort, probably daily small doses should be given. In the most acute types of disease a dose of 150r to 200r (200 kilovolts) filtered through one millimetre of copper and one millimetre of aluminium and administered through a field of about 10 centimetres by 10 centimetres to the front of the shoulder gives good results. In the majority of cases the pain will subside within forty-eight hours. A total dose of more than 800r is rarely necessary. If transport difficulties arise as they very often do, it will be necessary to increase the dose and lengthen the interval between treatments. A dose of 300r to the shoulder repeated at intervals of three days is satisfactory in the acute type of case. There is no doubt that the medium voltage range of 180 to 275 kilovolts filtered through one or two millimetres of copper gives the better results, but if no other method is available the lower voltage range can be used. Usually about three treatments only are necessary.

I have treated several patients with a 110 kilovolt machine filtered with one-quarter of a millimetre of copper and one millimetre of aluminium, localizing the field as much as possible to the area of tenderness; a dose of 300r is given, repeated after three or four days. There is a disadvantage, particularly amongst women, that occasionally an erythema with a faint remaining pigmentation of the skin is caused by this dosage, but the results have been good.

Deep X-ray therapy in the subacute and chronic stages of the disease is also of great value, but the percentage of good results is lower than in the acute stage and response is slower. In most cases it will be found that a more prolonged course of treatment is necessary, and this may have to be repeated after some weeks or months. The best results here again are obtained by medium voltage irradiation. A two-field technique is used, with fields anterior and posterior to the shoulder alternately, treatment being given every second day over two weeks. As a general rule a dose of 300r to 400r is given at each treatment, so that each field receives 900r to 1200r to the

skin. This gives a fairly uniform irradiation of the shoulder area.

Relief of pain may follow one to two treatments, but it is more usual to find improvement occurring in the first week after the completion of the course.

There is no doubt of the value of irradiation in subacromial bursitis, and as such good results are obtained in the acute and subacute stages, it is suggested that treatment be given at these stages.

OSTEOARTHRITIS OF THE HIP: SURGICAL TREATMENT.¹

By JOHN HOETS,
Sydney.

PAIN, unrelieved by conservative methods of treatment, is the predominant indication for operation for osteoarthritis of the hip. Limitation of movement when one hip only is affected is not as a rule very disturbing to the patient unless there is gross flexion adduction deformity. Stiffness of both hips is, of course, quite a different matter and, whether pain is present or not, calls for some mobilizing surgical intervention, if this can hold out any reasonable promise of relief.

Indications for Operation.

Indications for operation then are:

1. Pain, often severe and crippling, unrelieved by physiotherapy *et cetera*.
2. Limitation of movement, when both hip joints are affected.
3. Deformity. The common flexion adduction position, even though the joint itself may be painless, causes pelvic tilt to a greater or less degree with chronic strain on joints of the lumbar part of the spine and the pelvis (lumbosacral and sacro-iliac). This may be tolerated by younger subjects with healthy tissues, but with increasing age and weight and the development of spondylitis and sacro-iliac arthritis the strain becomes increasingly difficult to bear.

Contraindications to Operation.

Morbus coxae senilis naturally is found very frequently in persons whose general condition is not good enough to justify major surgery except as a life-saving measure. Hip joint surgery is shock-producing and the patient submitted to operation should be a "fair risk". However, not by any means every case of osteoarthritis of the hip is one of *morbus coxae senilis*, and comparatively young and vigorous individuals may suffer from this distressing condition following trauma. Perthes's disease, slipped femoral epiphysis *et cetera*. These will be found most favourable subjects for operation.

Choice of Operation.

I propose to discuss three types of operation: (i) arthrodesis, (ii) subtrochanteric osteotomy, and (iii) arthroplasty.

Arthrodesis.

Provided that one hip is healthy, a sound bony ankylosis on the other side gives probably the most satisfactory hip from the points of view both of painlessness and of stability. Hard manual work is possible without distress and there is no pain at all. There is, of course, loss of agility and mobility, and for sedentary occupations in which strength is not so necessary as a fair range of movement, an ankylosed hip is perhaps less satisfactory than one that has undergone a good arthroplasty. It is often difficult to obtain good bony ankylosis, the reason being that the blood supply to the acetabulum is deficient owing

¹ Read at a combined meeting of the Section of Orthopaedics and Physical Medicine and the Section of Radiology and Radiotherapy of the Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

to sclerosis from long-standing degenerative changes. There is an old saying: "If you want a desis aim at a plasty; if you want a plasty aim at a desis". While this is not quite accurate there is just enough truth in it to remind us that a good result—that is, solid bony ankylosis—may be difficult to obtain. One objection to the operation is the length of time required for immobilization—that is, about three months.

A satisfactory technique is to bare the head of the femur and acetabulum after dislocation of the joint, pack the cavity with cancellous bone chips from the crest of the ilium and then fix the head with a long Smith-Petersen nail (4-inch or 6-inch) which goes right through the head and into the innominate bone. A plaster spica is then applied. If the pelvic bone is not too sclerosed a good firm solid hip should result.

The optimum position is in about 15° each of flexion and abduction.

As before stated, arthrodesis gives a solid painless hip suitable for heavy strain and therefore should, I think, be reserved for individuals young enough to have a prospect of years of activity. For the elderly patient who will not be a manual worker, and for the sedentary worker, or for one who will probably spend a large proportion of his life in a chair, arthrodesis is not the most suitable procedure.

Osteotomy.

Osteotomy of either the Lorenz or cuneiform type will generally give very satisfactory relief of pain when the joint is suitable. A suitable joint for osteotomy is one in which the normal shape of the acetabulum and femoral head and neck has been reasonably maintained. Articular cartilage, as seen in X-ray films, although thinned out or absent in the superior weight-bearing quadrant of the joint, is present over the remainder of the head and acetabular cavity. Pain in such a joint appears to be caused by the movement of bare bone on bare bone in weight bearing.

The Lorenz osteotomy alters the line of weight bearing by bringing the femoral shaft under the acetabulum and also by causing some degree of rotation of the femoral head, so that there is no longer bare bone to bare bone, but a portion of the head still with some articular cartilage is brought under the bared area in the acetabulum. I think both these factors help in bringing the remarkable relief which follows operation.

The great objection to this type of operation has been the fixation in a plaster spica for eight weeks or more necessary to hold position until union occurred. This objection has been removed by the development of the internal splint, a modification of the Blount plate, such as that devised by Dr. Tom King of Melbourne.

After osteotomy and fixation by a Smith-Petersen nail and plate screwed to the femoral shaft, the patient is nursed comfortably without other splinting. Elderly people are spared the trials of plaster spicas which, although they should be quite comfortable, are rather terrifying and do offer some problems in nursing when the nurse is not trained in orthopaedic nursing.

The great feature of this type of operation is relief of pain, often to a much greater degree than the surgeon anticipates. Disappointing results are caused by submission of unsuitable joints to operation. When, for instance, there are large irregular masses of new bone both from acetabular margins and from the head and neck of the femur, the relief obtained from osteotomy is not so great as may be expected from arthroplasty.

Arthroplasty.

This discussion is confined to osteoarthritis, so other conditions such as double bony ankylosis will not be considered.

The hip joint has tempted surgeons to perform arthroplasty for many years as it appears eminently suitable anatomically for such a procedure. Unfortunately the mechanical and anatomical features are not the only factors. Living tissue has a habit of resenting surgical

insult and good carpentry does not always produce the good functional results which are expected. When the joint has been shaped so that the moving parts seem to work smoothly, something must be interposed to prevent the opposing surfaces from becoming adherent and so limiting movement or preventing it altogether; in other words, to prevent a "desis" from resulting instead of the desired "plasty". The use of fibrous tissue sheets, pig's bladder *et cetera* has been at times excellent results.

The problem has been made very much simpler by three things: (i) the development of chemical substances to combat sepsis; (ii) the development of that wonderful metal vitallium; (iii) the genius of Smith-Petersen who, after years of work with various materials for interposition, has made use of vitallium for the "hip cap" in arthroplasty and has thus given us a technique which allows a reasonably good result to be obtained with reasonable certainty.

I would like to pay homage to this great man, Smith-Petersen, who by his surgical acumen and skill and his mechanical genius has done so much towards solving the problems of hip surgery. It would be hard to arrive at even a remote estimate of the number of elderly lives saved by the use of his triflanged nail, or of the number of people who have resumed normal activities instead of living on in pain in a wheeled chair after having sustained fracture of the femoral neck. The number who are living comfortable lives following arthroplasty with the use of his hip cap is rapidly increasing as the method becomes more generally used.

At present the dollar shortage is holding back vitallium supplies from Australia but some relief may soon be expected.

Again I draw attention to the point that this discussion is confined to operation for relief of osteoarthritis, so that I shall not go into the question of arthroplasty in rheumatoid or other forms of arthritis except to say that if any active disease is present arthroplasty is contra-indicated.

The operation itself presents some technical difficulties when there is great distortion of the general shape of cavity and head.

In the simple straightforward case in which pain is due to the wearing away of articular cartilage there is generally no need to deepen or otherwise alter the shape of the acetabulum. The head of the femur must be reduced in size (a sharp osteotome and a file do the job very well) until the vitallium mould or cap which has been found by trial to fit loosely in the acetabulum also fits loosely over the head. The cavity is then inspected and carefully cleared of any debris which may have fallen in during the shaping of the head. This is prevented largely by packing a small sponge in as soon as the head is dislocated, but in spite of every care small pieces of bone may find their way in and unless removed may easily cause trouble.

I have not described the operation in detail as that has been done by Smith-Petersen himself and his description is a classic.

The special instruments which are used and described by Smith-Petersen are not available. They would without doubt make for greater speed and a neater job, but with patience a satisfactory result may be obtained with the usual bone kit. The head is dislocated, when the capsule is opened, by external rotation and adduction of the limb, and it is replaced by internal rotation after the vitallium cap is in place. It will be noted at this stage how easily dislocation occurs with external rotation, and with external rotation only. This point must be borne in mind in after-treatment, and both in my experience and in the reports of other surgeons dislocation may occur during convalescence. It happened in two of my cases, but in each reduction was not difficult under "Pentothal" anaesthesia. I think the method of nursing to be described later is an effective counter measure.

The operation is not so easy when there is distortion of the parts by degenerative changes, and one may find a joint which bears no resemblance to the ball and socket of which it is supposed to be an example. The head may be large, flat and irregular and the neck non-existent,

being replaced by an enormous irregular mass of exostoses to which the capsule is firmly adherent.

The capsule must be divided and stripped, the fact being borne in mind that it will be needed later. Dislocation is brought about by external rotation of the limb and flexion of the knee to a right angle, the assistant in charge of the limb pressing down on the knee and pulling the foot across to the other side of the body—that is, full external rotation and adduction. The surgeon will now find that the large misshapen head and neck, although out of the acetabulum, almost completely hide that structure from view.

My advice is not to worry about that for the present. Pack a small sponge into the cavity to keep out bone chips and start remodelling the head and neck of the femur. The assistant in charge of the limb is of the greatest assistance by so rolling the limb as to give the surgeon the best possible access to that part on which he is working.

It is found that, when modelling is nearly complete, the movements are much easier and the dislocated head and neck reduced in size will now, on being retracted, allow a good view of the acetabulum. If the head and neck have been grossly misshapen so also will be the acetabulum. It, too, will have to be altered. Large osteophytes from the margins are removed, the capsule being preserved as well as one may, and the flattened cavity is reamed out to such a shape as will receive the vitallium mould. I have found a large electric burr quite useful for this purpose. The cap is fitted and the hip reduced after one has made sure that no bony debris is left lying about. The limb is placed in internal rotation and held so from this point on. I think this is important. The capsule is reconstructed, the muscles are reattached, and the wound is closed.

To minimize the risk of infection I administer penicillin locally and parenterally for some days.

I have gradually reduced splinting to a plaster boot with a cross piece of wood to hold the foot in medial rotation for two weeks when the plaster is removed and replaced by a leather slipper with wooden cross piece. This can be removed for exercises and replaced easily.

I find that the patient is ready to get up in from two to four weeks, and I allow weight bearing when he feels like it. He uses crutches at first. Physiotherapy is necessary as the hip-moving muscles have often been more or less out of action for a long time on account of pain and must be carefully reeducated by graduated exercises.

There may be, as mentioned before, considerable shock in hip-joint surgery, and it is advisable to give the patient a litre of blood starting the drip administration with the start of operation and continuing it on removal of the patient from operating theatre to bed.

Results.

I have not a very large series to report and the records are incomplete, but they may be summarized as follows:

1. Arthrodesis (one case): a failure which was followed by arthroplasty in June, 1948.
2. Osteotomy (two cases): one of the cuneiform type with plaster fixation and one of the Lorenz type with plate and screw fixation. These both gave complete relief of pain and in one case the hip functions well although the range of movement is not so good as that following the arthroplasties.
3. Arthroplasty (eight cases).¹ All except two patients were completely relieved of the crippling pain and the patients were all very pleased with the functional result.

Reports of Cases.¹

CASE I.—A woman, aged sixty years, suffered fracture of the neck of the left femur in September, 1945, and was treated by means of the Smith-Petersen nail. Aseptic necrosis of the head of the femur developed with gradual onset. The nail was removed in February, 1947. On October 8, 1947, the head of the femur was found at operation to be softened and degenerated. The greater trochanter was removed and reattached lower down the shaft. A hip cap was inserted. The patient became maniacal after operation and remained completely mad. She

¹A cinematograph film showing patients before and after arthroplasty was shown.

has not recovered at all, and lies immobile, though she can be moved without apparent pain. She does not speak, takes food when offered, but has to be fed.

CASE II.—A woman, aged sixty years, complained on July 19, 1943, that she had had pain in the hip for fifteen years and had limped for twelve years. On examination her hip was fixed in adduction and flexion with about half an inch of shortening of her leg. X-ray examination revealed advanced osteoarthritic changes. Arthroplasty was carried out on June 5, 1945. When last seen she was complaining still of a good deal of pain and had to use a crutch. X-ray examination showed the hip cap in place, but the greater trochanter impinging and preventing abduction. It should have been displaced downward. I have seen nothing of this patient for eighteen months, nor received news of her.

CASE III.—A medical practitioner, aged fifty-five years, complained of increasing pain and disability from his hip. He stated that he had reached his limit and could not carry on as he was unable to stand for any length of time and could not get into a car without pain. The cuneiform type of osteotomy was performed with plaster fixation. His pain was completely relieved and he has regained a large degree of normal activity. Three years after operation he walks well and can even run and dance.

CASE IV.—A light, frail man, aged seventy-nine years, had constant pain in his right hip, which was practically fixed in flexion adduction. He underwent arthroplasty with insertion of a hip cap on January 23, 1948. Convalescence was uneventful and pain was completely relieved. He has been walking well with a stick, but has developed carcinoma of the stomach. His hip is quite comfortable.

CASE V.—A schoolmaster, aged fifty-six years, complained on October 9, 1944, of pain in the hip increasing in severity over some years. It had become constant and greatly interfered with sleep. His hip was practically fixed in a position of 40° of flexion adduction. Arthroplasty with insertion of a hip cap was carried out on December 16, 1944. In October, 1947, he was very satisfied, though the cold weather stiffened him up. He used a stick, but at times walked quite well without it. He did all sorts of manual jobs, gardening, cement work *et cetera* and slept well.

CASE VI.—A woman, aged fifty-four years, had a history of pain gradually getting worse for three and a half years. It had become constant and prevented sleep. She took five or six "A.P.C." tablets a day until she began to "go blue". On examination her hip was fixed in flexion (45°) with some abduction. X-ray examination revealed advanced osteoarthritis with a large exostosis. Arthroplasty was performed on September 9, 1947. She was nursed without plaster and, as she understood that she would be up in about two weeks, she was found walking round her bed on September 14, 1947, without pain and with very little effort. (Her weight was six stone nine pounds.) On November 16, 1947, she had slight pain only. Almost full extension of the hip was present with flexion to 75° and abduction to 40°; external rotation was fair and internal rotation practically absent.

CASE VII.—A man, aged forty-five years, was involved in a motor-car smash in March, 1939, and suffered dislocation of the right hip with fracture of the acetabular rim for which he underwent open reduction. In March, 1941, he was experiencing increasing pain and stiffness and arthrodesis was carried out with insertion of a long triflanged nail. On October 30, 1941, he fell and sustained a spiral fracture of the upper third of the same femur. He managed fairly well with the use of a stick until May, 1948, when he experienced a sudden increase of pain. X-ray examination showed fracture of the nail, and clinically the ankylosis was not firm, a small range of movement being present. Arthroplasty was performed on June 25, 1948.

CASE VIII.—A man, aged sixty-six years, had for years suffered from increasing disability and pain in both hips, being confined to bed and a wheel chair for three years; every attempt at hip movement was accompanied by severe pain and a loud cracking noise. He was admitted to Lewisham General Hospital and operation was performed on the left hip on March 8, 1945, with insertion of a hip cap. The right hip was subjected to operation about three months later, but became infected and dislocated; the dislocation was reduced without difficulty under general anaesthesia and the wound healed after some weeks, but the tissues remained swollen and painful. When discharged from hospital he still had a good deal of pain, but was able to sit comfortably. He was seen again in 1947 and admitted to the Western Suburbs Hospital in a most unhappy general state; he had pain in the right groin, and the whole of the right lower limb was very swollen and oedematous with an eczematous condition of the skin. Penicillin was administered for several weeks with remarkable results. The whole of the

pain and swelling cleared up and the skin healed. After five weeks in hospital he could stand fairly erect and take a few steps; he was free of pain. It is to be noted that he was a most unpromising subject, being very fat and "soft" after three years in bed or on a chair with his hips almost completely immobilized.

B.C.G. VACCINE.¹

By E. A. NORTH,

Commonwealth Serum Laboratories, Melbourne.

In a paper read at the plenary session evidence was advanced to show that non-reactors to tuberculin living in a heavily infected environment are likely to benefit from B.C.G. vaccination, a procedure which is entirely safe. It was pointed out, however, that there are many B.C.G. problems still unsettled, including the degree and duration of immunity following vaccination, which may be carried out by any one of several different methods.

The following remarks concerning the preparation of B.C.G. vaccine and its use in the field of preventive medicine are based largely on personal observation made during a recent trip abroad.

Preparation of B.C.G. Vaccine.

In spite of previous evidence to the contrary (Petroff *et alii*, 1929; Jensen, 1946), B.C.G. strains now used in different countries vary little in virulence. Bøe (1947) examined strains from four different laboratories maintained as shown in Table I and found no definite difference in their virulence. Calmette originally used a medium containing bile to attenuate B.C.G., whilst others now maintain that bile actually increases its virulence. It is suggested that bile favours the development of vigorously growing "R" variants.

TABLE I.
Cultivation of B.C.G. Strains (Bøe, 1947).

Source of B.C.G. Strain.	Method of Maintaining Culture.
Dr. Wassén's Laboratory, Gothenburg, Sweden.	Bile-potato for over 20 years.
State Serum Institute, Copenhagen, Denmark.	Sauton's synthetic liquid medium for several years.
Pasteur Institute, Paris.	Glycerol-potato since 1939.
B.C.G. Laboratory, Bergen, Norway.	Bile-potato and glycerol-potato alternately for some years.

In all ten laboratories visited vaccine was prepared from Sauton cultures, but the age of the culture when harvested varied from eight to nearly thirty days in different places.

Preparation of the vaccine consisted in separating the pellicle from the culture fluid, which is discarded, esti-

¹Read at a combined meeting of the Section of Pathology, Bacteriology, Biochemistry and Experimental Medicine and the Section of Public Health, Tuberculosis and Tropical Medicine, Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

mating the moist weight of bacteria and triturating it in a ball-mill. The required amount of diluent was then added and samples of the finished product were taken for bacteriological tests. Vaccine was generally dispatched for use after two days if there was no evidence of contamination and used up till ten days after harvesting.

Variation in these different procedures was marked and resulted in vaccines differing greatly in quality, which seemed to account, partly at least, for the differences in the dosage recommended and the results obtained. I gained the impression that the following factors were particularly important in producing an antigenically adequate vaccine unlikely to produce disagreeable reactions: (a) use of a young, vigorously growing culture; (b) accuracy in dispensing vaccine; (c) evenness of bacterial suspension combined with a high proportion of viable B.C.G.

Although no international standard is possible until a stable dried product is made available, some attempts at standardizing procedure are being made in the Scandinavian countries. We are endeavouring to produce a vaccine of similar quality in Australia.

Conditions to be controlled for safety include: (a) lack of capacity of the B.C.G. strain to produce progressive disease, (b) absence of contamination by virulent *Mycobacterium tuberculosis* from outside sources, (c) absence of other pathogenic bacteria.

The difficulty is, of course, that the vaccine to be fully effective must be used long before full tests on the finished product are completed. The safety measures adopted varied greatly. The main differences between Calmette's methods of B.C.G. production and those used in Scandinavia are set out in Table II.

The Use of B.C.G. Vaccine.

Only a few dogmatic statements can be made regarding principles which should be applied to the use of B.C.G. vaccine. They are, however, based on informed opinion overseas.

1. There should be one source only of B.C.G. vaccine for general use in any one country. Production should not be on a competitive basis.

2. There should be a close liaison between those producing B.C.G. and those using it. Only in this way can the strength of the vaccine be adjusted so that optimum results are obtained—a high tuberculin conversion rate together with a minimum of disagreeable complications.

3. One method only of administering B.C.G. should be used. The one most favoured is intradermal injection.

4. For satisfactory results a good technique in vaccinating is essential. In Norway, where vaccination is now compulsory, doctors are to be given a licence, issued by the chief of a recognized tuberculosis dispensary, only when they can vaccinate properly.

5. Before any large-scale immunization project is started the cooperation of the medical profession and the public should be sought (by presentation of scientific papers, newspaper articles, radio *et cetera*).

6. There should be a uniform method of selecting those for vaccination, including a rigidly standardized tuberculin test and X-ray examination of all but newborn infants.

TABLE II.
Preparation of B.C.G. Vaccine: Procedure Adopted in Various Laboratories.

Procedure.	Laboratories Following Calmette's Original Methods.	Laboratories Adopting Scandinavian Modifications.
Maintenance of cultures ..	Varied. At Pasteur Institute strain has been maintained exclusively on glycerol-potato for some years.	Varied. Differences at the various Scandinavian laboratories have already been pointed out.
Culture for vaccine ..	Sauton "2" 3-4 weeks' culture.	Sauton "2" 8-14 days' culture.
Estimation of weight of B.C.G.	Approximate only. Assumed to be constant weight in culture flask after about 21 days.	Carefully estimated after pressing between filter papers or in special apparatus.
Preparation of suspension ..	Great variation in amount of trituration in ball-mill.	Less variation.
Safety measures ..	Location of laboratory, health standard for staff, bacteriological tests <i>et cetera</i> on vaccine varied.	Not uniform, but always good.
Period over which vaccine was used.	Usually released after 48 hours' bacteriological tests and used up to 10 days.	Similar.

7. There is no evidence that B.C.G. unfavourably affects the course of the disease in those vaccinated during the incubation stage of tuberculosis, but such an occurrence tends to discredit B.C.G. vaccination and should, therefore, if possible, be avoided.

8. Vaccination should be offered to healthy "tuberculin-negative" persons in an infected environment after the full facts about B.C.G. have been placed before them. In Saskatchewan hospitals vaccination is carried out only on the basis of a signed request by the individual desiring it (Ferguson, 1946).

9. Those who are still non-reactors eight weeks after B.C.G. vaccination should be reinoculated. Full records of X-ray examinations, Mantoux tests, vaccinations *et cetera* must be kept.

10. Newborn infants may be vaccinated without tuberculin testing if immediately isolated from sources of infection. They must not be returned to a tuberculous milieu until "tuberculin-positive".

The above principles, together with reasons advanced in support of them, are set out in Table III.

TABLE III.

Some Widely Accepted Principles Regarding Use of B.C.G.

Principle.	Reason.
1. Production should not be on a competitive basis. There should be one producing laboratory only, for general use in any one country.	Competition might lead to some relaxation in "safety" measures. There is no international standard and a single source of supply ensures least variation in antigenicity.
2. Close liaison is necessary between laboratory producing B.C.G. and doctors using it.	Results in humans is final means of assaying vaccine. A high tuberculin conversion rate with minimum of complications is criterion of correct dosage.
3. One method only of administering vaccine is recommended.	In countries where more than one method is used a strong vaccine for "transectaneous" use has been injected intradermally.
4. Whatever method is used, good technique is important.	If intradermal method used, injection must be shallow or abscess occurs; if too shallow, leakage occurs with insufficient dosage. With multiple puncture or scarification, poor technique usually means insufficient or irregular dosage.
5. Cooperation of medical profession and public necessary for success of any ambitious B.C.G. project.	This was experience of Ferguson in Canada and was obtained by presentation of scientific papers and by Press, radio and screen propaganda. In Scandinavia there is much propaganda.
6. Methods of "screening" those for vaccination, obtaining their co-operation, retesting after vaccination, re-vaccinating, follow-up, and recording should be uniform.	The actual vaccination is only one part of procedure in B.C.G. immunization.
7. Newborn infants of tuberculous parents may, if immediately removed from source of infection, be vaccinated without preliminary Mantoux test. It is difficult to convert them to "Mantoux-positive" state with B.C.G.	They may be assumed to be free of tuberculosis at birth.

A suggested procedure for carrying out B.C.G. vaccination and "follow-up" in hospitals is set out in Table IV, whilst the type of information about B.C.G. which might, either verbally or by pamphlet, be given to those likely to benefit from B.C.G., is set out in an appendix.

Bibliography.

- J. Boß: "On Variations in the Virulence of *Bacillus Calmette-Guérin*". "Fourth International Congress for Micro-biology, Copenhagen, 1947; Abstracts of Communications", page 51.
- R. G. Ferguson: "B.C.G. Vaccination in Hospitals and Sanatoria of Saskatchewan". *American Review of Tuberculosis*, Volume LIV, 1946, page 325.
- K. A. Jensen: "Practice of the Calmette Vaccination". *Acta tuberculosis Scandinavica*, Volume XX, 1946, page 1.
- S. A. Petroff, A. Branch and W. Steenken, junior: "A Study of the *Bacillus Calmette-Guérin* (B.C.G.). I. Biological Characteristics, Cultural Dissociation and Animal Experimentation". *American Review of Tuberculosis*, Volume XIX, 1929, page 9.

APPENDIX.

Some Facts About B.C.G. Vaccine.

What is B.C.G. Vaccine?

B.C.G. (*Bacillus Calmette-Guérin*) is a bovine strain of the tubercle bacillus so attenuated (weakened in virulence) by special laboratory methods that it is incapable of producing progressive tuberculous disease in animals or man. A vaccine prepared from living B.C.G. has been shown experimentally to afford protection against subsequent tuberculous infection in animals and in human beings.

Safety of B.C.G. Vaccine.

Several millions of persons have been inoculated with B.C.G. vaccine since 1921 without ill effects. Leading doctors all over the world are now convinced that B.C.G. vaccine is perfectly safe when it is properly prepared and used. In Norway B.C.G. vaccination is now compulsory.

Those Likely to Benefit from B.C.G. Vaccination.

Only those who so far have avoided contact with the tubercle bacillus, as shown by a negative result from a Mantoux test, can benefit from B.C.G. The Mantoux test is carried out by injecting tuberculin into the skin. A positive reaction is shown by the presence of swelling and redness at the site of injection two or three days later.

TABLE IV.

Suggested Procedures for B.C.G. Vaccination in Hospitals.¹

Procedure.	Reason.
1. Mantoux test using 0.1 millilitre 1:1000 old tuberculin on entry.	Use of single strength simplified procedure.
2. X-ray examination of "Mantoux-negative" subjects before vaccination.	Extra precaution and useful for future reference.
3. Vaccination to be on a voluntary basis after full facts concerning B.C.G. have been presented.	When facts are properly presented (harmlessness, lessened risk of tuberculosis, possible complications including small scar) few refuse and B.C.G. will not become discredited.
4. Vaccinate on signed request of those concerned.	Avoids basis for possible future complaints.
5. Examine site of vaccination one month later and record any local reaction.	Obvious.
6. Repeat Mantoux test, using same dose of old tuberculin as for "screening", eight weeks after vaccination.	Essential to use same dose of tuberculin. Experience in Scandinavia suggests eight weeks' interval is necessary to pick all who will become "reactors".
7. Re-vaccinate those who remain non-reactors.	Reaction to tuberculin is criterion of success.
8. Observe entire group during stay at hospital by (a) X-ray examination at six-monthly intervals (sooner in presence of symptoms). (b) Mantoux tests at yearly intervals and re-vaccinate those reverting to "tuberculin-negative" status.	The actual vaccination is only one small part of a successful B.C.G. immunization project.
9. Uniform record cards should be kept.	Necessary for collection and analysis of data.
10. Vaccination may be carried out whilst nurse is on duty in general wards.	Ferguson found 1% infection rate per month in general hospitals in Saskatchewan.

¹Based largely on Ferguson's experience in Saskatchewan hospitals and sanatoria.

Reaction following B.C.G. Vaccination.

B.C.G. vaccine is injected in the same manner as is tuberculin for the Mantoux test. A small lump gradually forms at the site of injection with some surrounding redness of the skin. A small ulcer may later develop which will heal within two or three months, leaving as a general rule a barely perceptible scar. There is practically no pain or tenderness nor any feeling of general ill health. There may be some slight temporary enlargement of lymph glands in the armpit or groin, depending on the site of vaccination.

Results of B.C.G. Vaccination.

Those entering hospitals as student nurses may be either "Mantoux-negative" or "Mantoux-positive". Tuberculosis is likely to develop much more frequently amongst those who were "Mantoux-negative" than amongst those who were "Mantoux-positive" when they commenced training, and it has been shown that by B.C.G. vaccination of the "Mantoux-negative" subjects the incidence of tuberculosis amongst them may be greatly reduced.

Dr. Heimbeck in Oslo, Norway, first made these observations, which have been amply confirmed by others, notably by Dr. Ferguson in Canada. Dr. Ferguson has reduced the incidence of tuberculosis amongst the more susceptible ("Mantoux-negative") members of the staffs of hospitals and tuberculosis sanatoria by 75% to 80% by B.C.G. vaccination. The incidence of tuberculosis amongst those vaccinated is now as low as amongst those who were "Mantoux-positive" (comparatively resistant) when they commenced training.

Limitations of B.C.G.

Tuberculosis will occasionally develop in a vaccinated person just as it does sometimes in one who was originally "Mantoux-positive". Therefore all the generally accepted measures for maintaining good health and avoiding unnecessary risk of infection should be taken in addition to B.C.G. vaccination.

Occasionally a person in the incubation stage of tuberculosis, when symptoms, X-ray evidence and a positive result from the Mantoux test are all absent, will be vaccinated. In such a case, B.C.G. will not prevent the disease developing, but it will do no harm. Some leading authorities believe that it will lessen the severity of the illness that is developing.

Summary.

1. B.C.G. vaccination is a perfectly harmless procedure.
2. B.C.G. will reduce to one-quarter the incidence of tuberculosis amongst young susceptible persons entering an infected environment (student nurses *et cetera* who are "Mantoux-negative" when starting training).
3. Vaccination is almost painless, but small ulcers are likely to form at the site of inoculation (upper arm or thigh), which will heal completely without leaving a conspicuous scar.

THE EPIDEMIOLOGY OF PRIMARY HERPES SIMPLEX INFECTION.¹

By S. G. ANDERSON and J. HAMILTON,

The Walter and Eliza Hall Institute of Medical Research, Melbourne.

In 1938 Dodd, Johnson and Buddingh⁽¹⁾ showed that herpes virus could be isolated from most cases of aphthous stomatitis in infants. Burnet, Lush and Williams^(2,3) in Australia then applied serological methods to demonstrate that these infections represented the primary experience of herpes in such children. They considered that after this primary infection the virus persisted throughout the life of the patient in some of the tissues initially involved. Under a variety of circumstances familiar to every physician, but acting through a mechanism by no means understood, the virus periodically resumes its activity and induces the familiar lesion of recurrent labial herpes. A constant finding in infants who have recovered from herpetic stomatitis and in persons of any age who are subject to labial herpes is a persistently high level of circulating herpetic antibody.

Recently an opportunity arose to study the incidence of stomatitis among 240 children, all under the age of three years, in a Melbourne orphanage. The studies recorded in the present paper were made over the period of eleven months from March, 1946, to February, 1947; they included clinical observations and estimations of serum antibody levels against the virus of *herpes simplex*.

Materials and Methods.

Herpes Virus.

The virus used was strain H.F. adapted to growth on the chorio-allantois of the chick embryo.

Human Serum.

Blood was obtained from infants by puncture of the lobe of the ear and collected in a modified Wright capsule. In this it was allowed to clot, then centrifuged to separate the

serum. The serum was drawn off and sealed in a Pasteur pipette, in which it was heated at 56° C. for thirty minutes, and stored at 4° C. until required.

Titration of Virus and of Serum Antibody.

The techniques were essentially those described by Burnet and Lush, which depended on the production of pocks on the chorio-allantoic membranes of chick embryos inoculated at twelve days. Serum was used at a final dilution of 1:18; the number of virus particles in 0.05 millilitre of serum-virus mixture was chosen as 400 for a "positive" serum, and approximately 40 for a "negative" serum, so that a readable number of pocks was found on each membrane. Virus and serum were mixed and held at 4° C. for two hours before being inoculated onto the chorio-allantois. Each inoculum in each titration was put into eight eggs simultaneously. The results of serum titrations are given as the number of foci in the eggs inoculated with virus-serum mixtures, expressed as a percentage of the virus-saline control. In general, all of the serum samples from one individual were titrated at the same time; but there were occasional exceptions to this practice.

Isolation of Virus.

A cotton-wool swab was rolled gently over the ulcerated oral mucosa, and immersed in 0.5 millilitre of nutrient broth. It was kept at 4° C. until it reached the laboratory a few hours later, when the swab was wrung out into the broth. The latter was inoculated onto the scarified cornea of a rabbit. The presence of virus was demonstrated by the production of a keratitis; fluid from the inflamed eye produced pocks on the chorio-allantois, pocks subsequently serologically identified as herpetic. Subsequent work has shown that broth wrung from such swabs will induce virus growth directly on the chorio-allantois if bacterial growth is inhibited by penicillin and sodium sulphamerazine. Primary isolation on the chorio-allantois appears to be of the order of 100 times as sensitive a method as isolation on the rabbit cornea.

Experimental Procedure.

The orphanage has been described by Meehan and Merrillees.⁽⁴⁾ It is divided into nurseries, each holding between 15 and 25 children. Infants less than six months old are confined to their own wards, but at about this age they pass to nurseries where they make contacts with older children. In these older nurseries herpetic episodes are common, so that all the children in them are frequently and heavily exposed to the virus.

We chose for our study all the available children who had no previous history of stomatitis or *herpes febrilis*, of whom 51 remained under survey for the period of eleven months. They were bled at intervals of approximately four months through the year. The sera were titrated for herpetic antibody on the chorio-allantois of the developing chick embryo and the results were interpreted in the light of clinical observations of the same children prior to and through this period.

Results.

Twenty of the 51 children suffered an attack of stomatitis during the year. Although some of these cases occurred singly, the disease tended to appear in small outbreaks of about five cases, every two to three months. Two children were each noted to have the disease on two occasions, the recurrence in each case being comparable in severity with the original attack. In four of the primary cases attempts were made to isolate the causal virus by the inoculation of mouth swabbings onto the scarified cornea of a rabbit. Three of these attempts were successful. None of the 20 children showed herpetic antibody in those samples of serum obtained before the onset of their initial attack of stomatitis; but it was readily demonstrated that, subsequent to this episode, all had developed a level of antibody comparable with that of adults who are subject to labial herpes. (Details of these cases are shown in Table I).

These findings are in agreement with the suggestions advanced previously that stomatitis in children is frequently the manifestation of a primary infection by the virus of *herpes simplex* and that this infection induces a high level of antibody which may persist throughout the life of the individual. We believe that the virus of *herpes*

¹This work was carried out under a grant from the National Health and Medical Research Council, Canberra.

TABLE I.
Children who Developed Stomatitis.

Patient.	Age in March, 1946. (Months.)	Onset of Stomatitis.		Serum Antibody ¹ to Herpes Virus.			
		Date.	Age. (Months.)	March, 1946.	June, 1946.	October, 1946.	February, 1947.
OB	13	24.4.46	14	75	2.0	<0.3	1.0
OW	16	27.4.46	17	66	<1.0	<1.5	<1.8
MA	13	29.4.46	14	100	0.25	<0.3	<1.8
HO	15	2.5.46	17	95	1.5	<1.0	2.0
AR	15	5.5.46	17	85	<0.25	<0.3	<0.3
FA	18	3.7.46	22	90	85	<0.3	0.3
WI	10	12.7.46	14	95	100	0.5	1.5
RE	10	18.7.46	12	100	85	0.9	1.9
BE	8	20.7.46	12	80	100	0.39	0.27
WH	7	26.8.46	12	85	100	2.0	<1.5
MG	10	26.8.46	16	100	95	2.5	3.6
CO	14	29.8.46	19	100	100	2.0	<0.8
ON	15	30.9.46	20				
HW	8	1.9.46	21	100	100	2.5	1.5
OH	10	5.9.46	14	60	90	1.0	1.5
BO	9	15.9.46	16	100	90	1.0	0.6
JA	12	26.9.46	15	100	100	0.25	4.0
WO	6	20.10.46	19	60	75	50	4.0
OT	7	23.10.46	14	80	100	90	7.0
		19.11.46	15	100	90	95	<0.25
		13.12.46	16				
PA	7	3.12.46	17	30	80	70	0.36

¹ Expressed as percentage to which the number of foci was reduced by the action of serum. A low figure indicates a high titre of antibody.

simplex was responsible for these 20 cases of stomatitis in the Melbourne orphanage during the year of our survey.

In 1944 Buddingh and Dodd¹⁰ described an apparently unrelated virus as the cause of certain cases of stomatitis and diarrhoea in infants. Neither the clinical syndrome nor the causal virus has yet been described in Australia. No evidence of the existence of this disease was observed in the present studies.

Of the 51 children who were bled at intervals during the year, 31 did not at any time show clinical evidence of stomatitis, although they must have been exposed to the infecting virus on many occasions. We have divided this group of 31 into four sections, according to the sequence of antibody titres shown by these children during the year.

Ten children exhibited a significant antibody level at the time of the first bleeding, the level in four cases being lower than that typical of an herpetic subject. The titre

primary attack of herpetic stomatitis. We consider those in this group to have experienced a subclinical infection with the virus between the ages of eleven and twenty months (Table III). Child HE is included in both Table II and Table III.

Seven children were found to have a high and relatively constant level of antibody throughout the period of eleven months' observation. As the age of each of these subjects at the beginning of the survey was greater than seventeen months, it is probable that the members of this group had experienced a subclinical infection prior to the time of their first bleeding (Table IV).

Six children had no detectable herpetic antibody when first bled in March, 1946, and did not develop antibody during the eleven months, although they were in wards where herpetic infections were of frequent occurrence. Their ages in February, 1947, varied between fifteen and nineteen months (Table V). Two of them (BI and SC)

TABLE II.
Children who Lost Maternal Antibody.

Patient.	Age in March, 1946. (Months.)	Approximate Age of Loss of Detectable Antibody. (Months.)	Antibody ¹ to Herpes Virus.			
			March, 1946.	June, 1946.	October, 1946.	February, 1947.
DA	1	3	1.0	95	75	90
CE	2	4	5.0	80	75	75
KE	1	5	<1.0	—	100	75
BE	2	6	1.6	66	85	100
BI	6	7	7.5	100	100	—
WI	6	8	3.0	40	40	—
WO	4	9	0.3	33	100	100
HE	9	11	<1.0	90	90	2.4
DA	3	12	1.2	15	40	100
ME	6	15	8.0	25	20	100

¹ Expressed as percentage to which the number of foci was reduced by the action of serum. A low figure indicates a high titre of antibody.

² Titration not done.

progressively decreased to reach a negligible level during the year. The ages of the children at the time of complete disappearance of the antibody, which we consider to be of maternal origin, varied from three to fifteen months (Table II).

Nine children with no antibody in the first sample of serum subsequently developed and maintained a high level in the absence of clinical evidence of herpetic infection. The rise in antibody occurred between the ages of eleven and twenty months. Such a serological finding is in every respect typical of the response of a susceptible child to a

TABLE III.
Children who were Subclinically Infected with Herpes Simplex Virus.

Patient.	Age in March, 1946. (Months.)	Approximate Age at Time of Primary Herpetic Infection. (Months.)	Serum Antibody ¹ to Herpes Virus.			
			March, 1946.	June, 1946.	October, 1946.	February, 1947.
OD	11	12	100	3.6	4.0	3.0
WA	13	13	16	1.5	5.0	0.27
CA	9	14	75	85.0	0.8	0.25
SE	5	14	40	50.0	90.0	0.5
NI	15	16	100	1.0	4.0	10.0
HI	7	16	90	90.0	65.0	4.6
BE	15	18	60	20.0	1.6	2.0
HV	13	18	100	100.0	1.0	5.0
HE	9	18	<1.0	90.0	90.0	2.3

¹ Expressed as percentage to which the number of foci was reduced by the action of serum. A low figure indicates a high titre of antibody.

were bled again in June, 1947, by which time both had developed a high titre of herpetic antibody in the absence of an attack of stomatitis.

We may summarize these observations as follows. Of the 51 children, 29 developed herpetic antibody between the ages of eleven and twenty-two months, and seven had a high antibody level when first bled between the ages of eighteen and twenty-five months. In 20 cases this development of antibody was associated with stomatitis and in 16 cases the infection was subclinical. During the period of our survey the incidence of subclinical infections was nine in 29. The other 15 children had not reached the

age at which they became susceptible to herpetic infection; the maternal antibody present in the serum of 10 of them at an earlier age fell below a detectable level between the third and fifteenth months of life.

The exact ages of incidence of the nine subclinical infections which occurred during the survey were not established; but we have made approximations within the periods of about four months covering each subclinical attack. These approximate ages have been combined with the exact ages of incidence of the 20 clinical attacks to form Figure I.

TABLE IV.
Children who Carried Active Herpetic Antibody in March, 1946.

Patient.	Age in March, 1946. (Months.)	Antibody ¹ to Herpes Virus.			
		March, 1946.	June, 1946.	October, 1946.	February, 1947.
GL	18	<0.6	<0.6	— ²	— ²
CO	19	<1.0	0.3	2.0	<1.0
WA	19	1.5	1.5	— ²	0.27
MK	22	2.0	4.5	0.3	<1.0
OC	22	<0.6	2.0	0.6	<0.25
DU	25	1.0	1.0	1.5	— ²
SC	25	<1.0	<1.0	<0.3	5.0

¹ Expressed as percentage to which the number of foci was reduced by the action of serum. A low figure indicates a high titre of antibody.

² Titration not done.

On the basis of our results we have prepared Figure II to illustrate the course of herpetic antibody in the serum of the average child born of a herpetic mother and admitted to the orphanage within the first few months of life. The arrow indicates the onset of herpetic infection, corresponding to the antibody rise shown. The broad band between eleven and twenty-one months covers the period of maximum incidence of primary herpetic infection.

TABLE V.
Children who did not Develop Herpetic Antibody.

Patient.	Age in March, 1946. (Months.)	Age at Last Examination of Serum. (Months.)	Serum Antibody ¹ to Herpes Virus.			
			March, 1946.	June, 1946.	October, 1946.	February, 1947.
DA	4	16	80	— ²	— ²	100
BT	4	16	85	80	— ²	75
BI	5	17	85	80	90	100
MD	7	18	50	80	75	50
SC	8	19	95	90	95	95
OC	9	15	100	100	80	— ²

¹ Expressed as percentage to which the number of foci was reduced by the action of serum. A low figure indicates a high titre of antibody.

² Titration not done.

Discussion.

The most interesting feature of the observations was that despite adequate exposure to infectious subjects of herpetic stomatitis infants under eleven months of age did not become infected by the virus. The maximum incidence of infection in the group studied was in the fourteenth month of life.

It has been suggested that herpetic infection is predominantly a disease of the poorer classes. Burnet and Williams⁽¹⁾ have indicated that their figures, and those previously recorded by Andrewes and Carmichael,⁽²⁾ show that herpetic antibody is found in a significantly higher proportion of individuals in the less favoured strata of society than among the more privileged classes. For example, they found that of 55 patients attending an Australian public hospital, 93% were herpetic, but that of 27 samples of sera obtained from medical students and graduates, only 37% contained herpetic antibody.

It is probable that the great majority of the mothers of the children in our group were herpetic subjects. We

believe, therefore, that Figure II, showing the presence and decline of maternally transmitted antibody and the subsequent production of active antibody, represents what happens in the majority if not all of the infants admitted to the home.

Between the disappearance of circulating maternal antibody, at the age of about seven months, and the sudden rise about seven months later there is an interval during which the child is apparently resistant to herpetic infection in the absence of demonstrable serum antibody. In seeking the reason why children under one year do not contract herpetic stomatitis despite exposure to infection, environmental, immunological and genetic factors will need consideration. No evidence was obtained that the degree of exposure to infection or the likelihood of trauma to the oral mucosa from spoons, cups or adventitious objects increased significantly between the ages of six and sixteen months.

The possibility that there is an intrinsic genetically determined resistance of the tissues to infection, a resistance which disappears at the age of about twelve months, is not an immediately attractive idea.

The third hypothesis is that resistance before the age of twelve months is due to the persistence of maternal immunity beyond the period during which serum antibody is demonstrable by our technique.

A decision between the latter two hypotheses would rest on the result of a survey of the age incidence of herpetic stomatitis in children of non-herpetic mothers. If such children were susceptible to infection by the virus during the first few months of life we should have good reason to believe that the protection evident among the children in our orphanage group was due to maternally transmitted immunity. We would then have to postulate that such maternal immunity persisted in the infant for about twice as long as did demonstrable circulating antibody.

These considerations suggest the possibility of protecting the young child from herpetic stomatitis and from the subsequent liability to suffer recurrent labial herpes. If

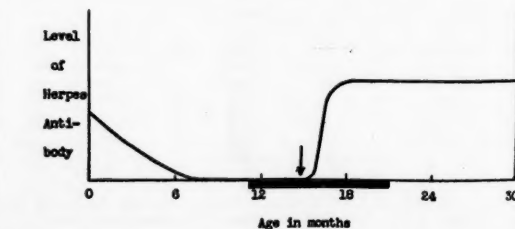


FIGURE I.

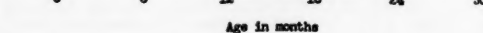


FIGURE II.

passive immunological factors play a part in the natural protection of these children under the age of one year, there is reason to hope that vaccination with killed herpes virus will ensure a similar period of protection after that age. Such vaccination would have to be carried out in the first year of life and possibly repeated within one or two years.

The common clinical experience is that the liability of children to acquire a primary herpetic stomatitis decreases sharply with increasing age. It would be desirable that

protection by vaccination should persist until the child reached that age (perhaps five years) at which he acquired such non-immunological resistance to herpetic infection as is characteristic of adult tissues. The efficacy of herpetic vaccination of infants is being studied at the present time.

Summary.

Fifty-one children under the age of three years, in contact with herpes virus, but with no prior history of stomatitis, were studied for one year.

The age incidence of primary herpetic infection was from eleven to twenty-two months, with a maximum at fourteen months. Of 20 serologically determined infections, nine were subclinical.

Between the ages of seven and fourteen months most children had no detectable circulating herpetic antibody, but were not subject to infection.

Acknowledgement.

It is a pleasure to acknowledge the advice and criticism given by Dr. Burnet during this work. These studies would have been impossible without the ready cooperation of the sisters in charge of the orphanage.

References.

- ¹ K. Dodd, L. M. Johnson and G. J. Buddingh: "Herpetic Stomatitis", *Journal of Pediatrics*, Volume XII, 1938, page 95.
- ² F. M. Burnet and D. Lush: "Herpes Simplex: Studies on the Antibody Content of Human Sera", *The Lancet*, Volume I, 1939, page 629.
- ³ F. M. Burnet and S. W. Williams: "Herpes Simplex: A New Point of View", *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume I, 1939, page 637.
- ⁴ G. J. Buddingh and K. Dodd: "Stomatitis and Diarrhoea of Infants Caused by a Hitherto Unrecognized Virus", *Journal of Pediatrics*, Volume XXV, 1944, page 105.
- ⁵ C. H. Andrewes and E. A. Carmichael: "Presence of Antibodies to Herpes Virus in Post-Encephalitis and Other Human Sera", *The Lancet*, Volume I, 1930, page 857.
- ⁶ J. F. Meehan and C. R. Merrillees: "An Outbreak of Cerebro-Spinal Meningitis in a Foundling Hospital", *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume II, 1940, page 84.

OCULAR PROSTHESIS, WITH SPECIAL REFERENCE TO THE CONJUNCTIVAL SAC.¹

By DOROTHY B. WAUGH, D.D.S.²

It has been estimated that for every Pacific invasion during World War II approximately eighty eyes were lost by American servicemen. This high percentage forced the dental officer in the field to increase the supply of artificial eyes available by constructing the non-breakable acrylic eye as a substitute for glass. His efforts were supplemented by the Bureau of Standards in Washington, which carried out exhaustive tests on the permanence of pigments used and the fixation of colour when subjected to the monomer (liquid) of methyl methacrylate.

Methyl methacrylate is the chemical term used to describe a certain specific chemical formula of plastic materials used in the construction of artificial dentures. From the hundreds of possible chemical combinations of carbon, hydrogen and oxygen the one named has been found to be the one tolerable to the tissues of the mouth. Therefore, empirical use of other compounds for this purpose is considered dangerous. The Council on Dental Therapeutics of the American Dental Association has approved methyl methacrylate for use in denture construction. It is axiomatic that this material may be acceptable to the mucous membrane of the eye also. The designation "acrylic" given to this new artificial eye is taken from the "acryl" of methacrylate.

¹ Expanded from a paper read at a meeting of the Ophthalmological Society of Victoria on June 22, 1948.

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The venture into the fabrication of the acrylic eye was undertaken by dental officers of the United States army and navy. The author's knowledge of navy methods used in this work was made possible by the cooperation of Rear-Admiral Rault, Dental Division of the Naval Training Centre, Bethesda, Maryland, United States of America.

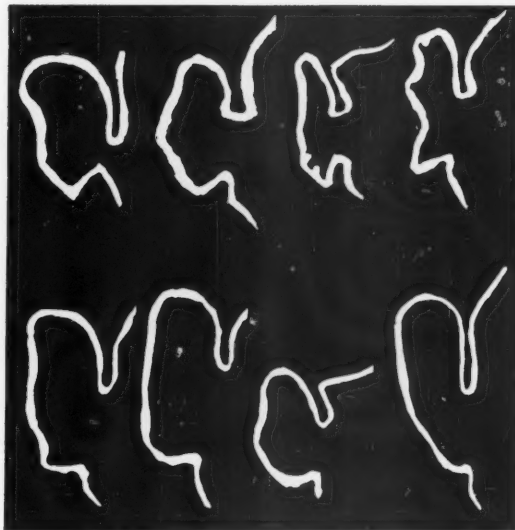


FIGURE I.

The author's method of making the iris completely of acrylic varies, however, from that used by the army and navy, which is by means of a paper disk upon which the iris is painted and which is subsequently inserted between two layers of acrylic.



FIGURE II.

The Conjunctival Sac.

It is the conjunctival sac with which we are primarily concerned in the making and fitting of an artificial eye. An analysis of the conjunctival sac and the problems which it presents are as follow.

Its Normal Form and Function.

The conjunctival sac is the mucous membrane of the eye attached to the corneal-scleral border of the globe, extending upward and downward to form a fornix under both lids, and passing onto the rims of the upper and lower eyelids at the palpebral fissure. There is a conjunctival slack in both fornices which provides for eyeball movements. The presence of this slack is as important to the natural eye as its absence is unfortunate for the wearer of an artificial eye. How to maintain this slack following an excision of the eye is of great concern to me.

The structures which surround the conjunctival sac are of interest to us since their form and function in the orbit alter with excision of the eyeball. Those which are of

eye can restore this fold. The familiar staring artificial eye is indirectly the result of the obliteration of the conjunctival slack (Figure II).

The conjunctival sac now presents a picture similar to that of the smooth mucous membrane of the mouth. It is no longer flaccid and yielding. The removal of the organ results in a general collapse of the soft tissue which it supported, such as that layer of fat between the globe and the ceiling of the orbit. To a lesser extent the same thing holds true in the floor of the orbit, but with less cosmetic disadvantage to the patient.

Surgical Procedures.

It would appear that there are two methods of preparing the pocket to accommodate an artificial eye. (a) The first

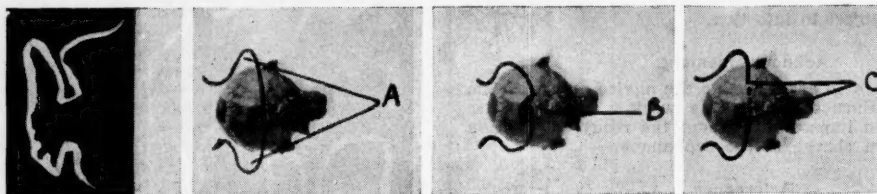


FIGURE III.

immediate concern are, in order of their importance, (a) the superior rectus muscle, (b) the levator muscle above it, (c) the superior oblique, (d) the inferior oblique, (e) the inferior rectus and (f) the lateral and medial recti muscles. Furthermore, between the conjunctival sac and the ceiling and floor of the orbit is an all-important layer of fatty tissue, which, with the orbicularis and levator muscles, helps to give contour to the eye as the *orbicularis oris* and *levator labii* give contour to the mouth.

Its Post-Operative Form and Function.

The extent and location of the conjunctival sac ill equip it as a lining for the orbital cavity after the excision of

is by suturing the cut edges of the conjunctival sac together. In very many cases a tendinous string is observed in the medial upper quadrant of the pocket which could be identified as portion of the superior oblique muscle. Artificial eye manufacturers have notched their artificial eyes to accommodate this thread to avoid contact with it, as it thrusts the eye forward in the socket. It is erroneous to consider the inclusion of muscle fibres as aiding in the movement of an artificial eye if they are included in the suturing of the sac. The author is of the opinion that the inclusion of a gold or glass ball serves no

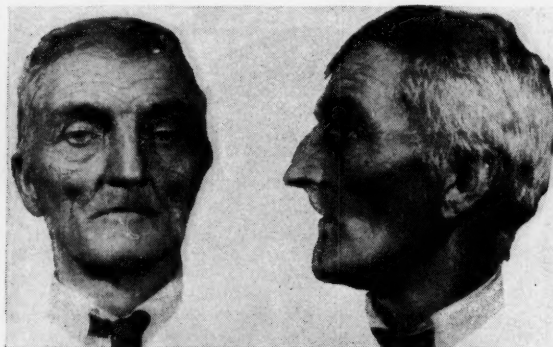


FIGURE IV.

the eye (Figure I). The reasons for this are as follows. (a) It is situated in the anterior section of the orbit and has no backward extension such as Tenon's capsule. (b) After the excision of the eye its cut edges drawn together form a curtain, so to speak, separating the larger posterior cavity of the orbit from the smaller anterior chamber. This smaller anterior chamber can rarely accommodate an artificial eye of normal size and shape in a given case. (c) When the drawn edges of the conjunctiva are brought together in what has been termed by J. H. Prince the "tobacco bag suture" the upper eyelid is drawn backward. The resulting tension removes permanently the palpebral fold of the upper lid which the loose conjunctival slack had made possible. No design in the form of the artificial



FIGURE V.

FIGURE VI.

useful purpose whatsoever as an aid to movement or contour of the eye. (b) In the second method an epithelial or mechanical insertion between the cut edges of the conjunctiva would restore the conjunctival slack if that insertion was of the same diameter as the globe itself (Figure III).

An Immediate Insertion.

The author considers that the immediate insertion of an artificial eye following excision would yield as positive results as it does in the mouth, for it would (a) prevent the general collapse of the tissues and the contraction of

muscle fibres (Figure IV) which limit the capacity of the conjunctival chamber, (b) promote the stretching of the tissues and the retention of the palpebral fold, and (c) preserve the contour of the upper lid and the shape of the palpebral fissure.

The immediate insertion of an artificial denture in the mouth means that a denture, previously constructed, is placed over the bleeding sockets of extracted teeth. The biological and aesthetic advantages of this method are numerous, but its most spectacular result is that there is no alteration in facial contours, no falling in of the lower half of the face. Facial characteristics remain



FIGURE VII.

unchanged (Figure V). It is conceivable that an immediate insertion of an artificial eye would preserve the contours of the upper lid and prevent that sunken appearance between the upper lid and the margin of the orbit (Figure VI). It is here emphasized that only a surgical manoeuvre can accomplish this result, in much the same way that surgical procedures preserve alveolar bone and so preserve facial expression (Figure VII).

The procedures used would vary in certain particulars. For instance, the denture can be completed and placed in the mouth over the first (and most favourable bone-producing) blood clot. Instead of the artificial eye an acrylic splint would be inserted in the socket immediately after excision. This splint would be constructed previously from an impression of the closed eye which is to be excised (Figure VIII). This method would give the global contour and the horizontal and vertical extension of the artificial eye. Being a thin, light shell with an opening for aeration and drainage, it could be slipped beneath the eyelids, the traction of which would hold it in position and prevent the upper lid from being drawn inward by the contracting tissues during the healing period.

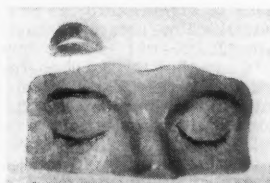


FIGURE VIII.

Conclusion.

The author wishes to acknowledge the cooperation of the members of the Ophthalmological Society of Victoria, before whom the problems of ocular prosthesis were discussed. Dental science today places equal importance upon aesthetic effect and functional performance. We must not condemn our patients to facial inharmonies, and in this respect the immediate insertion is, perhaps, dentistry's finest contribution to its art and its science. The aim in ocular prosthesis should be to retain the normal appearance of the patient, the dual responsibility of both surgeon and prosthodontist.

SOME CLINICAL ASPECTS OF WATER BALANCE.¹

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Perth.

To the clinician the water of the human body is now divided, as Professor W. H. Newton so succinctly puts it, into three compartments: (a) intracellular water, (b) interstitial or tissue fluid, (c) blood plasma; or more conveniently the water in the vascular channels, that in the cells and that between the cells.⁽¹⁾ Maintaining these divisions are the ions of potassium and phosphate of the intracellular water and sodium and chloride of both the cell and plasma water with the cell membrane as the dividing fence. As Professor Newton further points out, however, the plasma proteins by virtue of the fact that they alone are unable to permeate through the walls of the capillary blood vessels, and so maintain an osmotic pressure, are the main factors in permitting, in association with other mechanical factors of the capillary bed, the continuance of the circulation.

The practical application of such knowledge is of value to the clinician in a number of avenues of treatment. It is made clear that the administration of saline intravenously in large quantities may in some cases be not only inadvisable but positively harmful. It lays wide open the door of knowledge in regard to the fact that the condition of the blood is a determining factor in what is administered intravenously.

The continued administration of diuretics, particularly of the mercurial variety, without knowledge of the state of the blood, particularly in regard to the presence of haemoconcentration or the amount of circulating protein in the plasma, is unsound. Equally so is it wrong to continue the use of such drugs when the edema is controllable by simple reduction of the sodium intake.

In the first instance the result may be a further haemoconcentration without any marked subsidence of the edema, especially in cases of cardiac decompensation with prolonged albuminuria. It becomes clear that the intravenous administration of packed red cells, serum and protein and the oral administration of protein may be necessary preliminary measures.

In the second instance the body is faced with the position which would arise in prolonged thirst: the kidney would be "faced with the dilemma of having simultaneously to excrete water and salt and yet to economise water".⁽²⁾

There persists a belief that it is correct treatment to withhold protein from the diet of patients excreting albumin in the urine. Such treatment only tends to produce or encourage edema through disturbance of the water balance of the compartments. The clinician finds this more frequently in the presence of hyperpiesia, in the treatment of which it has become commonplace to regard the blood urea level as being of maximum importance and to pay little or no attention to either the plasma protein content or the haemoconcentration.

It would appear that migraine attacks are precipitated in some instances by water retention. It is more than coincidence that such a number of sufferers from migraine admit to an excessive intake of salt, and there can be no doubt that salt and water retention are intimately related. It has been shown fairly conclusively that, when salt is administered for a few days to a pregnant woman and weight increase occurs (as it does, only to drop again after the salt is withdrawn), the increase in weight is accounted for by the retention of water.⁽³⁾ In some, but not all of these cases, the reduction of the salt intake will reduce the incidence of the migraine. To carry the thought along these lines, the prevalence of migraine prior to menstruation and its cessation as soon as the menstrual flow commences can also be explained by the retention of water. There seems little doubt that the raised blood level of oestrin plays some part in the water retention of pregnancy.

¹ Read at a meeting of the Section of Medicine of the Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

A similar raising of the blood oestrin content occurs in the pre-menstrual period, the height being reached more suddenly than in the early days of pregnancy. This retention of water does not explain the trigger onset of migraine or the reason why the emphasis falls upon the external carotid artery. Wolf in his brilliant work showed that, apart from a few selected areas of the *dura mater* and the cranial nerves, pain arose within the skull from arterial distension. Surely this pulsating alternating pain of a dilated intracranial arterial system results from a sudden flooding of the arteries by circulating blood. Is it the result of or made possible by the water retention?

The modern treatment of pre-menstrual migraine is the administration of ammonium chloride. This drug was first used for its diuretic properties as an adjuvant to the mercurial diuretics, but is now used for its own virtues. It has its peculiar effect upon oedema through one of its actions which results in the acidifying of the urine "as the amount of sodium base excreted by the kidney is reduced and the ratio of acid phosphate to alkaline phosphate in the urine is increased". There are, however, those who present what at first sight might appear to be a negation of such ideas. Some women who suffer frequent attacks of migraine may carry through pregnancy without such attacks. As there is a large increase in the water retained in the body during pregnancy it could be thought that migraine would be more frequent under such conditions rather than the reverse. Our difficulty arises from the fact that, though we know that water is retained in the plasma and the interstitial fluid in pregnancy, little is known of the freedom of interchange, and the accuracy of estimation of blood volume in pregnancy is open to doubt. It may be that the sudden release of a quantity of fluid into the vascular channels is no longer possible.

Another possibility, however, is present. The sudden rise and fall of the blood oestrin content in the pre-menstrual period can have no inhibiting effect upon the pituitary gland. In fact it may quite easily have a stimulating action upon the pituitary gland with an increase in amount of the pituitary antidiuretic hormone. The reverse, however, occurs in pregnancy, in which the long-sustained and increasing rise in the oestrin content of the blood no doubt has an inhibiting effect upon the function of the pituitary gland, with a lessening in amount of the antidiuretic hormone.

Diuresis is a factor in migraine. The termination of the headache is often ushered in with a marked diuresis. The presence of diuresis at the onset of migraine which some authors describe has not been observed. The terminating diuresis had been noted frequently. It could be the result of the action of caffeine in the well-known aspirin, phenacetin, caffeine therapy, but the diuresis has been observed even when caffeine has not been administered. Whether or not it is the result of a possible temporary inhibition of pituitary function rather than the stimulation previously suggested, it adds weight to the theory that the causation of the syndrome is the retention of water in the vascular channels.

It is probable that there are other causes for the cessation of migraine in the early days of pregnancy, because it would be difficult to conceive that the inhibition of the pituitary gland function would become effective until at least the end of the first month, until in fact the conditions of normal menstruation had been superseded by those of pregnancy.

Two possibilities exist: the first that a special hormone is formed very early in pregnancy depressing the pituitary function or, secondly, that the relief experienced results from the normal increase of urinary output—this in turn may be the result of depression of production of the anti-diuretic hormone.

What is the explanation of the use of oestrin for the relief of menopausal headache? Again it may be the result of inhibition of the pituitary gland and of production of its antidiuretic hormone. What is even more likely is that the normal loss of oestrin control over pituitary function is restored temporarily by the administration of oestrin. At the menopause or from the pre-menopausal stage onwards it is believed, by not a few observers, that neither of the ovarian hormones, oestrin or progestin, is in

active production or producing its normal effect. Mazer and Israel in "Menstrual Disorders and Sterility" state:

During the initial phase of ageing of the ovaries, when follicles still develop in a more or less cyclical manner, a sustained and even a high level of oestrogen in the blood and urine prevails because of the diminished quantity or total absence of the corpus luteum hormone, progestin aids in the metabolism and excretion of oestrogen. Later, when the cyclic development of follicles is also impaired, there is a marked fall in the level of oestrogen and consequently diminished inhibition of the pituitary which results in the appearance of larger quantities of the gonadotropic hormone, both the follicle-stimulating and luteinizing principles.⁽⁴⁾

Thus the onset of headache of the migrainous type during the menopause or following it is the result of uninhibited action of the pituitary antidiuretic hormone. This may account for the fact that it has been found that the parenteral administration of oestrin in doses of 50,000 units at increasing intervals has more effect in many cases than the oral administration in smaller doses at the usual more frequent intervals—either daily or twice daily. The larger dose may have a temporary inhibiting effect upon the pituitary gland. It is clear that this cannot be the explanation in all cases because of the fact that at times the oral administration is found effective. An interesting condition of water retention has been made the subject of study with much practical result by Dr. Priscilla White⁽⁵⁾ working amongst diabetic pregnant women in association with Dr. E. P. Joslin at the George Baker Institute attached to the Deaconess Hospital, Boston.

Dr. White records that

profound disturbance of water balance is one of the characteristic features of pregnancy in the diabetic. This is shown by the abnormal gain in weight, oedema (85% of all cases), hydramnios (25%), hydræmia and fatal oedema.

The findings in her cases were a

low excretion of pregnandiol, low serum level of estrin, high serum level of chorionic gonadotropin and disappearance of basophilic navicular cells from the vaginal smear. The underlying mechanism appears to be faulty production of progesterone with poor production or metabolism of oestrogens and compensating high levels of chorionic gonadotropin.

This would place the deficiency in the ovaries themselves which were failing to respond to the stimulation of the follicle-stimulating hormone. But it must be evident also that the low production of estrin is permitting the pituitary gland to overact, the normal braking action of the estrin being absent. It is not the province of this paper to diverge into the conditions present, but it may be that the low progestin production is not permitting the full effects—and possibly production—of estrin. Suffice it to say that the condition again supplies grounds for the belief that the oedema is the result of over-activity of the antidiuretic hormone of the pituitary gland. It is of interest in support of the contention that the use of stilbostrol in the large doses of up to 200 milligrammes a day accompanied by 15 to 50 milligrammes of progestin has proved successful in overcoming the disabilities suffered by the pregnant diabetic. It must in deference to truth be admitted that Dr. White lays down the necessities of treatment as including, in addition to the administration of hormones, the use of ammonium chloride 60 to 120 grains daily, the restriction of salt, the prohibition of sodium bicarbonate and the prescription of a diet with a high protein content. These methods, however, proved inadequate prior to the use of the hormones in the manner worked out by Dr. White after extensive researches. Some clinicians are using oestrin only, instead of the combined treatment by oestrin and progestin. However, no one had doubted that the main factor responsible for the failure of the untreated diabetic to pass normally through pregnancy is the low production of estrin.

Another type of condition of clinical interest, emphasizing the control of the pituitary gland over water retention, is that described by Zondek as cerebral water-salt retention obesity.⁽⁶⁾ A typical case is described.

Miss J.B., aged twenty-one years, gave a history of late menarche between the ages of fifteen and sixteen years.

Her menstruation was reasonably regular until February, 1947, and since then each menstrual onset has been later and later delayed until she failed to menstruate in the month of December, 1947. She states that she has always been slightly overweight and on medical advice has taken thyroid off and on for years. She suffers from severe headaches not due to any error of optical refraction. These headaches fit the classical description of migraine and, though the last acute headache she suffered prior to seeking advice occurred on the day before her menstrual period, they do not always coincide with menstruation. On examination this young woman of pleasing personality and pink and white complexion presented an interesting picture. There was no facial hirsutism, but on the abdomen was hair in male distribution. Her height was sixty-three and a half inches and her arm span sixty-three inches. Her weight on February 8, 1948, was 152 pounds (nude) and on February 24, 1948, 154 pounds. This patient had a normal upper half to her body, but her buttock measurement was forty-four inches as against twenty-five and a half inches at the level of the umbilicus. The blood pressure was 120 milligrammes of mercury, systolic, and 70 milligrammes, diastolic. The buttocks and thighs on palpation felt as if they were full of water and were very different in tone from the buttocks of a well developed muscular young woman. Treatment with thyroid gland (dry extract), two grains per day, did not cause any loss of weight. A history was obtained of a severe thirst and a liking for salt. Despite an attempt to reduce the intake of fluid, seven pints were drunk in twenty-four hours and the amount of urine passed was just under five pints—these figures are the results of the patient's own calculations. An interesting feature of this case is that the patient's mother was affected with a toxic goitre, a history that is obtained in a considerable proportion of such cases. Persistence in the administration of thyroid results in reduction not of the oedematous lower limbs, but rather of the normal portion of the body with the toxic symptoms of overdosage. The basal metabolic rate is +6%. The patient complains of severe headaches which have persisted at varying intervals over years.

Hermann Zondek (in the second edition of his work, "The Diseases of the Endocrine Glands", page 52) states: "Recently it has been more fully recognized that the anterior lobe (of the pituitary gland) influences water metabolism." In view of the history in this reported case and others of parental thyrotoxicosis, Teel's statement is of interest: "Injection of an anterior lobe extract containing growth hormone causes polyuria in dogs."¹⁷ Barnes¹⁸ believes this polyuria to be due to the thyrotropic hormone, but Zondek reports this as unconfirmed by Gaebler. A frequently repeated statement is that large doses of oestrone inhibit the various functions of the anterior lobe and suppress its diuretic action. Shapiro¹⁹ credits ten milligrammes of oestradiol benzoate given parenterally on six successive days with reducing diuresis; yet it is known that water retention is observed in women when the oestrone secretion is at its height. It would appear to me that the dose given by Shapiro, even if sufficient to inhibit some functions of the pituitary, was insufficient to lessen the amount of antidiuretic factor—or what was more likely, as in the normal menstrual cycle, stimulated its production. The first statement that "large doses suppress the diuretic function" must be examined always to see the size of the dose and the length of time over which it is continued. Massive prolonged dosage produces hypertrophy of the pituitary gland with occasional tumour formation, giving rise to gross changes of metabolism, lack of growth and altered calcium balance, against which changes the altered diuresis must be measured. The size of dose to produce such effect can be estimated when it is realized that Mazer and Israel, in discussing the treatment of mazoplasia, report that the dose of oestrogen in these cases must be adequate.

The best results are obtained with 2000 rat units (the equivalent of 20,000 units of oestrone) given every three days over a period of three months. In women with a normal menstrual rhythm, this quantity of oestrogen may occasionally cause a single delay of the menstrual flow for from ten to twenty-one days.²⁰

If we return to Priscilla White's work it can in this connection be emphasized that the dose of oestrin used in her method of control is much greater than that stated to give such effects by Shapiro—namely, from five to fifty milligrammes of stilboestrol daily or every other day from at

least the twentieth week of pregnancy until parturition. In the presence of suppressed ovarian function this dose results not in suppression of diuresis, but in control of water retention. It may be argued that Dr. White's dose is one of substitution and that this dose of oestrin, large though it be, simply brings the oestrin level to normal. It does not, however, disprove the hypothesis that the unrestrained action of the pituitary gland is to favour water retention and that a return to normal control sees the elimination of water, and that supposedly the inhibition of pituitary gland function by oestrin would result in diuresis if the dosage was large enough to overcome the original stimulating effect of a slightly increased oestrin level over a short period.

What then should be the treatment of such a case of cerebral water-salt retention? It must not be overlooked that some of these patients eventually present a cerebral tumour. But for those who present no evidence X-ray treatment is not favoured, because low dosage irradiation is only likely to stimulate pituitary function and so increase the amount of antidiuretic factor permitting further water retention. More intensive therapy causing depression of other functions of the gland is not wise in view of the lack of knowledge of what further metabolic disturbances might follow such action.

The oral administration of whole pituitary gland is not recommended because again the antidiuretic factor could be stimulated.

If there is any basis for the hypothesis put forward in this paper, oestrin given in large doses over a long period is the rational treatment. It should be administered in a similar manner to that described for the treatment of mazoplasia, 20,000 international units every third day for three months. At present one patient has agreed to undergo treatment, which is just commencing, and progress cannot yet be reported.

Migraine is less frequent in the male in a proportion variously estimated at from one male to five females to one male to nine females, and such a difference is attributed to the fact that testicular hormones have less power to cause water retention. Does this account for the difference in skin texture of the two sexes? Again the type of male prone to migraine may be classed in general as hypogonadal. To carry the analogy on, is the migraine due to uninhibited action of the pituitary and of its antidiuretic factor? In support of this theory is the fact that in not a few cases male migraine can be relieved by the administration of testosterone propionate. A further similarity exists in the sexes in that migraine may abate in a male who has passed through a menopause, even though during that period the migraine was aggravated but relieved to some extent by the parenteral administration of testosterone propionate.

Summary.

1. The administration of fluid should be controlled by a full knowledge of the state of the blood.
2. The continued use of diuretics should be governed also by the haemoconcentration and the level of protein in the blood plasma.
3. The elimination of fluid from the body may at times be better effected by the control of the intake of sodium chloride or by the use of ammonium chloride.
4. Pre-menstrual headache may be relieved by the reduced intake of fluid and sodium chloride and the administration of ammonium chloride.
5. Pre-menopausal headache is probably related to the uninhibited action of the antidiuretic factor, the origin of this being the lessening of oestrogenic production. In the first stages the oestrogen may be activated by the administration of corpus luteum, but as the failure of ovarian activity becomes established oestrogen administration becomes necessary. In this stage, however, testosterone propionate has proved effective.
6. Menopausal headache is related to the increased activity of the antidiuretic factor of the pituitary following cessation of oestrin production in normal quantities and is relieved by the administration of oestrin.
7. The water retention in a pregnant diabetic is the result of low production of oestrin allowing overaction of

the pituitary gland and is controlled by the administration of oestrin in large doses accompanied by progestin.

8. It is suggested that the water-salt obesity of Zondek is the result of overaction of the pituitary gland, particularly the antidiuretic factor, and that it might be treated by the administration of large doses of oestrin at least twice weekly over a period of three months.

9. The theory is discussed briefly in relation to the male.

Conclusion.

This short paper is presented with the full realization that the antidiuretic hormone is posed as being centred in portion of the hypothalamus-hypophyseal system, that the stimulus which excites its production acts directly upon the cells of the supraoptic nuclei and that changes in blood concentration are thought to have an influence upon the output of the antidiuretic hormone.⁽¹⁾ The intention behind a paper written purely as the result of reading the work of those carrying out research with laboratory aids at their command and after these findings have been associated with clinical practice is to emphasize the importance of the antidiuretic hormone to the clinician, the value to him of the provision of an endocrinological laboratory and the use which could be made of the reports that such a laboratory would issue.

References.

- (1) W. H. Newton: Discussion on "Water Metabolism in Pregnancy", *Proceedings of the Royal Society of Medicine*, Volume XXXIX, July, 1946, page 558.
- (2) H. L. Marriott: "Water and Salt Depletion", *British Medical Journal*, Volume I, 1947, page 245.
- (3) R. H. Freyberg, R. D. Reekie and C. Folsome: "Study of Water, Sodium and Energy Exchange during the Latter Part of Pregnancy", *American Journal of Obstetrics and Gynecology*, Volume XXXVI, 1938, page 200.
- (4) C. Mazer and S. L. Israel: "Diagnosis and Treatment of Menstrual Disorders and Sterility", 1941, page 305.
- (5) E. P. Joslin, H. F. Root, Priscilla White, A. Marble and C. Cabell Bailey: "Treatment of Diabetes Mellitus", Eighth Edition, 1946, page 769.
- (6) H. Zondek: "The Diseases of the Endocrine Glands", Fourth Edition, 1944, page 261.
- (7) H. M. Teel: *Endocrinology*, Volume XIII, 1929, page 521; "Diuresis in Dogs from Neutralized Alkaline Extracts of the Anterior Hypophysis", *The Journal of the American Medical Association*, Volume XCII, 1929, page 760.
- (8) B. O. Barnes, J. F. Regan and W. O. Nelson: "Improvement in Experimental Diabetes following the Administration of Amniotin", *The Journal of the American Medical Association*, Volume CI, 1933, page 926.
- (9) B. G. Shapiro: "Control of Urinary Secretion by the Anterior Pituitary", *The Lancet*, Volume II, 1938, page 1457.
- (10) C. Mazer and A. L. Israel: *Loco citato*, page 130.
- (11) C. Brooks: "The Control of Water Body Balance", *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume I, 1948, page 187.

Reports of Cases.

THE SURGICAL TREATMENT OF VESICO-VAGINAL FISTULA FOLLOWING HYSTERECTOMY AND RADIUM TREATMENT FOR CARCINOMA OF THE CERVIX UTERI: CASE REPORT AND COMMENT.¹

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Clinical Record.

Mrs. J.F., aged forty-eight years, who had had five children, was first examined by me at her home in September, 1946, with a view to treatment of incontinence of urine. This condition had been present since the development of a vesico-vaginal fistula following radium treatment for carcinoma of the cervix in February, 1944. The patient was a stout, plethoric woman, confined to bed, and undergoing corrective plaster treatment by Dr. C. C. McKellar for deformities of the lower limbs.

¹Read at a meeting of the New South Wales State Committee of the Royal College of Gynaecologists and Obstetricians, held on May 29, 1948, at Sydney Hospital.

Her past history was briefly as follows. On August 31, 1942, she had been admitted to the Marrickville District Hospital with vaginal haemorrhage. The cervix was found to be unhealthy and total hysterectomy was performed. She was readmitted to the same hospital on April 19, 1943, with further haemorrhage, and an ulcer cavity was found at the vaginal vault. Haemorrhage was persistent and she was later transferred to the Royal Prince Alfred Hospital, where biopsy and insertion of radium were performed on August 20, 1943. The pathological examination revealed squamous carcinoma of the cervix uteri, stage III. Radium treatment comprised the insertion of 30 milligrammes of radium in a tube and 20 milligrammes of radium in a cork for a dosage of 3000 milligramme-hours. A second application of radium was performed on December 31, 1943, when similar treatment was given for a dosage of 1500 milligramme-hours. A second pathological examination revealed a vaginal recurrence of squamous carcinoma of the cervix. The patient was discharged from the Royal Prince Alfred Hospital on January 20, 1944, and subsequently reported to the follow-up clinic on February 2, 1944, with a vesico-vaginal fistula. On February 16, 1944, she reported again and complained of severe and continuous pain; the vaginal condition was found *in statu quo* and arrangements were made for her admission to the "Home of Peace", Marrickville.

The patient stated that she became "a bit mental" soon after going to the "Home of Peace"; pain was continuous, she was always "wet", and she lost the power of her legs and hands. Deformities of the feet developed during a long period of recumbency. After about one year there her mental and physical condition improved, she became interested in life, and returned home after a stay of approximately eighteen months.

On July 22, 1945, she was again admitted to Marrickville Hospital with equinus deformities of the legs; in attempting to stand she had fractured the medial malleolus of one foot. The fistula remained in the same condition and she was always "wet".

On January 1, 1946, the patient was taken for a motor-car drive, became involved in an accident, and was admitted to the Royal North Shore Hospital with supracondylar fractures of both femora. She was discharged from this hospital on January 12 in plaster casts which could not be taken up to the groins on account of her "wet" condition.

Despite the unfortunate past history and the patient's bed-ridden condition, her fortitude and optimism merited full gynaecological examination before treatment was denied. Any possible treatment depended on the presence or absence of carcinoma. In the absence of a growth something in the nature of a colpocleisis was considered a possibility.

The patient was admitted to Sydney Hospital and examination under anaesthesia was performed on October 9, 1946. A large vesico-vaginal fistula was present in the middle third of the anterior vaginal wall to the left of the mid-line. This comfortably admitted the end of the middle finger and was 1.5 centimetres in diameter. There was no evidence of recurrence of carcinoma, and the vagina, though not normal, showed surprisingly little fibrosis or atresia. There was no involvement of the urethra, and the fistula appeared to be away from the urethral orifices. My senior colleague, Dr. H. K. Porter, kindly examined the patient with me, and it was decided to attempt surgical repair after adequate pre-operative treatment. A clean vagina and clean urine were established by douches and irrigations, and operation was performed on October 18, 1946.

After the bladder had been irrigated and the vagina prepared, reasonable access to the fistula was found possible with the patient in the lithotomy position and without mobilization of the parts by the paravaginal incision of Schuchardt. The vaginal mucosa was mobilized around the circumference of the fistula by the "split-flap" technique of Mackenrodt and freed from the bladder. Mobilization of the bladder was difficult on account of fibrosis, and the edges of the bladder opening were then freshened, but not excised. The hole in the bladder was closed with four

interrupted fine absorbable catgut sutures and the edges of the vaginal mucosa were pared and similarly sutured. The vagina was treated with sulphonamide powder, a self-retaining catheter was inserted, and the patient was returned to the ward.

Catheter drainage into a bottle was continued for ten days, but frequently the bed was noticed to be wet. The patient was cyanotic and "chesty" for five days after operation, and nursing in the prone position was out of the question. No vaginal treatment or examination was performed. On removal of the catheter it was apparent that repair had not been successful, but the patient was much less "wet" than before operation. On November 6 (the nineteenth post-operative day) the patient was examined under anaesthesia and it was found that the fistula had closed to a small hole about two millimetres in diameter. It was decided to allow the patient to return home in a few days and to readmit her to hospital in three months.

The patient reported by telephone a few weeks later that she became "quite dry" one week after returning home from hospital. She wrote in December, 1946, reporting that she had remained dry and was passing urine normally. In January, 1947, while in hospital undergoing right supracondylar osteotomy, the patient developed post-operative cystitis and had incontinence of urine for one week. She has had no further urinary trouble since then, except some frequency of micturition (day eight to ten times, night three times).

Subsequent examinations have shown pronounced contraction of the vagina since operation and no evidence of recurrence of carcinoma.

The following points about this case should be noted.

1. There is an apparent four and a half year cure of carcinoma of the cervix *uteri* with known vaginal recurrence following total hysterectomy and subsequent treatment with radium.
2. A vesico-vaginal fistula developed within one month of the second course of radium treatment for vaginal recurrence.
3. No sign of growth was present and straightforward operative treatment of the fistula was possible nearly three years after its development.
4. The immediate result of operation was not completely successful; but the fistula closed spontaneously one week after the patient left hospital.

Comment.

A few observations on vesico-vaginal fistula in general and on this case in particular would appear to be relevant in view of the importance of fistula following treatment of carcinoma of the cervix either by irradiation or by radical surgery. My remarks are based on a study of the literature rather than on personal experience. We in Australia must consider ourselves occasional operators for this condition, in comparison with the amount of work performed in clinics abroad—notably in America, India and Egypt.

American gynaecologists agree that post-operative vesico-vaginal fistula is now far more common than that following obstetrical injury, and the most productive single source is hysterectomy by either the abdominal or the vaginal route. Allowing for the possibility of this complication in the treatment of malignant disease, Miller⁽¹⁾ has tersely stated that "there are too many vesicovaginal fistulas following too many hysterectomies".

Fistulae resulting from radiation therapy to the cervix for cancer constitute a particularly difficult problem on account of impaired blood supply, fibrosis, and the presence of tough edges. One or both ureteral orifices are frequently within the fistula margin and may easily be cut during operation. Although the condition is apparently operable, repair is less likely to be successful because the tissues for a considerable distance from the edge of the fistula are too devitalized for repair (Counsellor⁽²⁾). The principles of repair and post-operative care are the same as for other fistulae. It is difficult to assess the incidence of vesico-vaginal fistula in carcinoma of the cervix treated by radium. Strachan⁽³⁾ reported an incidence of 8.7% com-

bined bladder and rectal fistulae in 254 patients treated. Kaplan⁽⁴⁾ and co-workers recorded the presence of vaginal fistulae communicating with either the rectum or the bladder at the time of death in three of 88 patients treated. Graves⁽⁵⁾ and co-workers found that the incidence of fistulae in the primary therapy group was 4.7%, but this increased to 16.3% in patients who had received previous treatment elsewhere. The average duration of life of cancer patients who developed fistulae was about five months.

Fistula commonly occurs one year or more after radium therapy and is usually due to progress of the carcinoma rather than to late effects of irradiation. There is ample evidence that the incidence of vesico-vaginal fistula is increased among patients who have been treated with radium on more than one occasion. Graves⁽⁵⁾ recorded 62 patients with fistula following radiation treatment for carcinoma of the cervix, and of these, seven showed complete regression of cancer. Fistula is more likely to occur in patients treated for cancer of the cervical stump. Everett⁽⁶⁾ found that 55% of patients treated by irradiation for carcinoma of the cervix had cystoscopic evidence of some type of bladder disturbance, and bladder ulceration (not necessarily fistula) occurred in 2.5% of cases and in 7.3% of those retreated. The importance of cystoscopic examination before repeated radium therapy is obvious.

Gray Ward succeeded in closing two post-irradiation bladder fistulae by operation, and Twombly and Marshall⁽⁷⁾ have reported the successful cure of three patients with vesico-vaginal fistulae following irradiation for cancer of the cervix.

Pre-Operative Care.

A clean vagina and clean urine are essential before operation and these can sometimes be facilitated by the insertion of a Foley catheter into the bladder through the fistula (Counsellor⁽²⁾). Preliminary suprapubic cystostomy is not advised. Careful cystoscopic examination should be performed, the positions of the ureteral openings being noted, and excretion pyelography should be a routine procedure.

Anaesthesia.

Low spinal anaesthesia supplemented with small intravenous doses of "Sodium Pentothal" is suitable for the repair of fistula and for other vaginal plastic operations.

Operative Treatment.

The operative treatment of vesico-vaginal fistula has always "excited the ingenuity and taxed the skill" of the surgeon. The literature on the development and present-day technique of repair is of absorbing interest, and reference should be made to the excellent review and study of the subject by Mahfouz.⁽⁸⁾ It is generally agreed that the vaginal approach is the safest, simplest and soundest anatomically; but the surgeon must assess each case on its merits and be competent to perform any of the various operations, by the vaginal route (the Mackenrodt operation), by the abdominal retroperitoneal transvesical route (the Trendelenburg operation), or by the transperitoneal transvesical route (von Dittel).

The classical operation of Marion Sims (1862) with the use of wire sutures is now employed with success in the difficult repair of post-operative fistulae. Simon's colpo-cleisis is contraindicated when the uterus is *in situ*, but has been used by Latzko⁽⁹⁾ with great success for post-operative fistulae following total hysterectomy.

The choice of position of the patient varies with the surgeon and the nature of the fistula, and includes (i) the exaggerated lithotomy position, (ii) the Kraske or inverted Trendelenburg position, (iii) the Sims position, and (iv) the knee-chest position.

The general principles of the operation demand ready access to the fistula, free mobilization of the bladder, accurate apposition without tension and preservation of the blood supply. Technical points such as the choice of suture material, the direction and separation of suture lines and water-tight closure appear to be of secondary

importance. Purse-string sutures should not be used. Much has been written on the subject of suture material in this operation since the outstanding work of Marion Sims in 1862. It would appear that equally good results are obtained by the use of either fine absorbable catgut or chromicized gut number 00 or 000.

Post-Operative Care.

Since contraction of tissue goes on for some time even when the wound breaks down, and since small fistulae tend to heal spontaneously (Hayes⁽¹⁰⁾), post-operative care is of great importance. The bladder must be kept empty and clean, and this can be most effectively achieved by an indwelling catheter connected to a bottle tied to the bed. The catheter is left in the bladder for a period of five to twelve days, and care must be taken to avoid blockage of the catheter. The patient is nursed for preference in the prone position for the first three or four days on a split mattress or Bradford frame. Vaginal treatment in the post-operative period is contraindicated, and no vaginal examination should be carried out for at least three weeks after operation.

Prognosis.

The prognosis after any operation for the cure of vesicovaginal fistula is uncertain, but results in the hands of skilled workers using present-day technique in all types of vesico-vaginal fistulae are gratifying, and cure rates of 85% and over are reported.

Acknowledgements.

I am indebted to Dr. H. K. Porter for his advice and assistance at operation, and wish to thank Dr. C. C. McKellar for full cooperation while the patient was under orthopaedic care.

References.

- (1) N. F. Miller: "The Surgical Treatment and Post-Operative Care of Vesicovaginal Fistula", *American Journal of Obstetrics and Gynecology*, Volume XLIV, 1942, page 873.
- (2) V. S. Counseller: "The Treatment of Vesicovaginal and Other Pelvic Fistulas", in "Progress in Gynecology", edited by J. V. Meigs and Sturgis, 1946, page 473.
- (3) Strachan, quoted by R. Glyn Maliphant: "The Complications of Radium Therapy in Cancer of the Uterine Cervix", *The Journal of Obstetrics and Gynecology of the British Empire*, Volume XLVI, 1939, page 873.
- (4) H. S. Kaplan, H. M. Wilson and A. H. Morse: "Results and Causes of Failure of Radiation Therapy in Carcinoma of the Cervix", *Surgery, Gynecology and Obstetrics*, Volume LXXXVI, 1948, page 332.
- (5) R. C. Graves, C. J. E. Kickham and I. T. Nathanson: "The Bladder Complications of Carcinoma of the Cervix", *Surgery, Gynecology and Obstetrics*, Volume LXIII, 1936, page 785.
- (6) H. S. Everett: "Gynecological and Obstetrical Urology", 1944, page 164.
- (7) G. H. Twombly and V. F. Marshall: "Repair of Vesicovaginal Fistula Caused by Radiation", *Surgery, Gynecology and Obstetrics*, Volume LXXXIII, 1946, page 348.
- (8) Naguib Pacha Mahfouz: "Urinary and Fecal Fistulae", *The Journal of Obstetrics and Gynecology of the British Empire*, Volume XLV, 1938, page 405.
- (9) W. Latzko: "Postoperative Vesicovaginal Fistulas, Genesis and Therapy", *The American Journal of Surgery*, Volume LVIII, 1942, page 211.
- (10) S. N. Hayes: "The Operative Technique of Complicated Vesicovaginal and Urethrovaginal Fistulas", *Surgery, Gynecology and Obstetrics*, Volume LXXXI, 1945, page 346.

Reviews.

MALIGNANT DISEASE AND ITS TREATMENT BY RADIUM.

THE first edition of Stanford Cade's "Malignant Disease and its Treatment by Radium" was published in 1940 and most of it was destroyed by enemy action soon afterwards. Since then the second edition has been anxiously awaited.

¹"Malignant Disease and its Treatment by Radium", by Sir Stanford Cade, K.B.E., C.B., F.R.C.S., M.R.C.P., with a foreword by Sir Ernest Rock Carling, F.R.C.P., F.R.C.S., F.F.R.; Volume I; Second Edition; 1948. Bristol: John Wright and Sons, Limited. 32" x 6 1/2", pp. 396, with illustrations, some of them coloured. Price: 52s. 6d.

by those unfortunate enough to have missed the first. The second edition differs in that it is to be published in four separate volumes, of which the first volume is now available. The volume consists of two parts, "The Radio Activity of Radium" and "The Biological Effects of Radium".

The section on the radioactivity of radium is rather more than its title implies. There is a discussion of the general incidence of cancer, on the relative importance of surgery and radiation, and the general principles of radium treatment. The various techniques of radium treatment are described and there is a useful section on the preparation of radium moulds and applicators.

The excellent chapters on radium dosimetry and the measurement of radium plaques have been contributed by physicists Wilson and Gray.

It is good to see that the biological effects of radium on tissue, both normal and neoplastic, have been given due prominence. Most of the experimental work over many years has been studied and condensed, to give in clear terms a general idea of what is known today of the effects of irradiation on tissue. This knowledge is the foundation of successful radium treatment. There are many illustrations and diagrams and numerous references to the literature.

A final chapter on dangers of radium and protection should be read by all who use radium. The author stresses the fact that with attention to details of technique and a clear conception of the biological effects of irradiation, radium treatment should be as safe a method of treatment as any.

CARDIOGRAPHY.

THE second edition of "Jones and Chamberlain" was noticed in this journal on November 13, 1943. The third edition, which has now appeared, has a new co-author, Dr. E. L. Rubin, who contributes a section on cardiac radiology, so that the title "Electrocardiograms" has been changed to "An Elementary Atlas of Cardiology".¹

The electrocardiographic section retains very much its original form, the main modification being the inclusion of several tracings from lead CRI. The examples of normal electrocardiograms, only three in number, give the novice no idea of the commoner variations of the normal, nor does the text supply this information. However, perhaps the authors meet such criticism as this when they point out that their chief aim has been to supply for the student a set of representative electrocardiograms and that the publication is intended as an atlas rather than as a text-book. The chapter on "Preponderance", that is to say, ventricular preponderance, is somewhat skimpy and, rather strangely, comes almost at the end, after the chapter on infarction. This latter is headed "Coronary Thrombosis". The frontispiece, which we previously described as irrelevant, still appears; the legend is now "Standard Electrocardiograph Arranged on a Trolley", and it is stated to be by courtesy of a certain scientific instrument company.

The radiological section consists of seven pages of text and forty-one figures, mostly reproductions of skiagrams. These are well chosen; but, as in the electrocardiographic section, the student is given no illustrations to indicate the wide limits within which the cardiac silhouette may vary in healthy persons.

DISORDERS OF SEX AND REPRODUCTION.

"Disorders of Sex and Reproduction", by A. P. Pillay, is said to be intended for a circulation restricted to "doctors, teachers, social workers and others interested in guiding the young".² Although a wide field is covered, the author makes no claim that the book is complete, but states that where his experience has been meagre certain aspects of the subject have been omitted. In spite of this, much information is made readily available for those who wish to gain some idea of the problems of human sexual outlet and of the means by which they may be eased or overcome.

¹"An Elementary Atlas of Cardiology: An Introduction to Electrocardiography and X-Ray Examination of the Heart", by H. Wallace-Jones, M.D., M.Sc., F.R.C.P., E. Noble Chamberlain, M.D., M.Sc., F.R.C.P., and E. L. Rubin, M.D., F.F.R., D.M.R.E. (incorporating the third edition of "Electrocardiograms: An Elementary Atlas for Students and Practitioners"); 1948. Bristol: John Wright and Sons, Limited. London: Simpkin Marshall (1941), Limited. 8" x 5 1/2", pp. 120, with many illustrations. Price: 12s. 6d. net.

²"Disorders of Sex and Reproduction: Aetiology, Diagnosis and Treatment", by A. P. Pillay, O.B.E., M.B., B.S.; 1948. London: H. K. Lewis and Company, Limited. 8 1/2" x 5 1/2", pp. 316. Price: 18s.

Readers of this book will find it necessary to remember that its author writes from India, where conditions of life differ from those in our land and where sex life and child-bearing come early. Of those who are mothers in India it is said that 61% were mothers by the age of sixteen years and that 24.6% were mothers by the age of fourteen years.

The book is divided into eighteen chapters. The anatomy and physiology of sex are considered very briefly and then the problems of sex life are dealt with over a wide range, with sixty-nine case histories giving examples of the many conditions. The causes of all types of sex disorders are either psychic, endocrinal or organic. Much of the discord in sexual life is said to be due to psychic factors and ignorance. Coital technique is dealt with in detail.

In the section on hyperæsthetic sexual disorders in the male, excessive libido, satyriasis, priapism and premature ejaculation are dealt with, as are the corresponding conditions of excessive libido, nymphomania and vaginismus in the female. Bromides and other sedatives are said to be of doubtful value in controlling increased sex urge, though use is made of a capsule containing camphor monobromide, sodium bromide, lupulin and cascara, which is claimed to be helpful in cases of sexual neurasthenia.

Premature ejaculation is said to be so common that it may be considered an accompaniment of civilization. Five illustrative cases give some idea of the various psychic factors that may cause premature ejaculation and show how to investigate them. Many hyperæsthetic sex disorders remain uncured in spite of a judicious combination of various methods of treatment which the author discusses.

The anæsthetic sex disorders in the male which are mentioned are defective or absent libido, defective or absent erection and delayed or no ejaculation and orgasm. Satyri impotence is said to be common in many married men, when the sexual act with the wife has become a habit without enthusiasm and passion. The husband eventually becomes unable to play his part and may seek satisfaction elsewhere where his sexual powers are undiminished.

In regard to treatment of impotency, several drugs are mentioned, but the search for one which will increase sex powers and cure impotency still goes on. Benzedrine cannot be classed as an aphrodisiac and has not proved any more successful than alcohol in removing inhibitions. Hormonal treatment is sometimes helpful.

In atonic types of impotency it is recommended that luteal hormone alone or combined with small doses of testicular hormone should first be given, and when hyperæsthesia and irritation of the spinal centre have entirely disappeared that in cases of defective erection male hormone should be given alone in small doses or combined with small doses of follicular hormone.

Nine illustrative cases are included in the chapter dealing with sterility in the male, and instructions are given in regard to the collection of semen for examination.

In regard to hormone treatment, the author has not been much impressed by oral or sublingual administration except in the case of thyroid, follicular and luteal hormones. Intramuscular injections are more satisfactory. The method of implantation of hormone pellets is discussed and it is claimed that the absorption from implantation is more physiological than by other methods. The subject is still new and there is as yet no general agreement in regard to dosage.

The final chapter deals with artificial insemination.

This book is a useful addition to the many publications dealing with disorders of sex.

FEARLESS CHILDBIRTH.

THE title as well as the contents of the little book "Fearless Childbirth" will evoke immediately a favourable response in the mind of those who have been trying to secure for their patients "freedom from fear" of pregnancy and labour.¹ For far too long a time has "painless" been the word usually associated with the doctor's aim, and unfortunately this has led both parents to demand some guarantee that all pain shall be abolished without regard to the possibility of harm to either mother or child. Frequently this attitude of mind has been harmful to the mother and has made unnecessary difficulties for the *accoucheur*. The author sets out to show how the expectant mother, with the cooperation of her

husband, may help herself in both pregnancy and labour and thus reduce the amount of analgesic and other drugs needed and the consequent incidence of interference. Her main theme is based upon work and appropriate exercises together with the development of relaxation as a regular habit. The book is intended to educate the "mother-to-be" by giving her the practical application and a reasoned and adequate explanation of the physiology of childbirth in simple language. The author is to be congratulated upon the apt selection of the quotations placed at the chapter heads through the book. One chapter is headed "Baby's Arrival" and under this is the quotation: "In quietness and confidence shall be your strength". Those who are obsessed with the value of the parturient's wearing a face-mask while handling the newborn may be shocked at the recommendation that as soon as the mother can appreciate it, the baby should be placed in her arms and her finger in the tiny hand. Whatever may be the danger of respiratory infection carried from mother to baby, the psychological benefits are undoubted and the reflex effect upon the uterus universally acknowledged. The author explains the value of the bodily movements of a normal woman doing her ordinary housework as pre-natal and post-natal exercises; the dusting and polishing of the floor and the use of the humble dust pan and brush have their place in healthy and fearless pregnancy and childbirth, and are thus ennobled. A timetable is given for the commencement of post-natal exercises. Commencing while the patient is in bed and extending up to the fourth week, the exercises suggested vary with the type of confinement and the age of the mother. The book is faultless from the point of view of the obstetrician and, if the advice is followed, should prove invaluable to mothers; moreover, it does not end with labour, but a chapter is devoted to the natural and praiseworthy intention of the mother to regain her normal figure. The book is cheap, is small, under one hundred pages, and the diagrams, though small and simple, are very clear and unmistakable in their meaning. Doctors and nurses who undertake the care of the parturient woman would do well to make themselves acquainted with its contents, and it should certainly be read by every "mother-to-be".

HISTORICAL FOUNDATIONS OF MODERN CARDIOLOGY.

Two physicians on the staff of the Mayo Clinic have added still further to the prestige of that notable institution in the United States of America by combining to produce an authoritative work on "A History of the Heart and the Circulation".¹ The joint authors of this book, Dr. Frederick A. Willis and Dr. Thomas J. Dry, have made a thorough search of historical references to the subject in order to make a complete survey from far antiquity right up to modern times. It must have been a long and laborious task to compile such a mass of material and then to section it all for examination by the reader in both horizontal and vertical planes. Hence the book should serve a useful purpose in making it easy for the physician or research worker to find literature dealing with earlier investigations in this particular field of medicine.

In the preface the authors give an affirmation of their faith in the historical approach to all medical problems, and they emphasize the need for a greater development of the cultural side of medicine, including a more universal knowledge of the great medical classics. Further on they give reasons for the somewhat unorthodox method employed in their presentation of the subject matter, and show the advantage to be gained from illuminating each succeeding period by the inclusion of such extraneous historical circumstances as "social and political customs and beliefs, the influences of religious and other prohibitions, the evolution of mediums for the dissemination of knowledge and the development of medical teaching". This method of approach has undoubtedly helped to create the right atmosphere and to give the evolution of thought in the narrow domain of cardiology a proper perspective.

The book is divided into three major sections. The first is the "Chronological Presentation of Knowledge Relating to the Heart and Circulation", which covers the historical period from 5000 B.C. to the end of the first quarter of the present century. This section, which takes up half the book, is followed by a series of twenty special biographies of people

¹ "A History of the Heart and the Circulation", by Frederick A. Willis, M.D., M.S. in Med., and Thomas J. Dry, M.A., M.B., Ch.B., B.S. in Med.; 1948. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 9" x 6", pp. 475, with illustrations. Price: 56s.

¹ "Fearless Childbirth: What Every Mother-to-be Should Know", by Minnie Randall, O.B.E., S.R.N., S.C.M., M.C.S.P.; 1948. London: J. and A. Churchill, Limited. 7½" x 4½", pp. 107, with illustrations. Price: 3s. 6d.

whose work entitles them to historical prominence on account of advances initiated by them in extending knowledge of the heart and circulation. Lastly, there is a chronological presentation of data according to subject, in which a fund of historical information is given under headings such as the anatomy of the heart and circulation, congenital malformations, aneurysm, cardiac arrhythmia, the coronary vessels, electrocardiography, the surgery, pathology, physiology and therapy of the circulatory system.

It is a little surprising to find that Michael Servetus, after being deprived of his priority as the discoverer of the pulmonary circulation, has twelve full pages devoted to his biography, whereas the immortal William Harvey is dismissed with faint praise in a meagre five pages. And this seeming inconsistency bears a slight analogy to the statement on page 355 that Oliver Wendell Holmes recognized the contagiousness of puerperal fever long before Semmelweis, who received most of the credit. After all it was the Viennese obstetrician who gave the first definite proof based on his own observations and practical research, while Holmes mostly speculated on the theories of Dr. Alexander Gordon, of Aberdeen, and with the literary skill unfortunately lacking in Semmelweis, gave a convincing exposition of the contagious theory then coming into vogue.

Still another disturbing statement appears in the biographical sketch of Wilhelm Konrad Röntgen, where credence is given to one of the old "book and key" stories once widely circulated about the discovery of X rays. Many years after he became famous Röntgen commented with considerable resentment on the legendary accounts of those strange happenings in the physical laboratory at Würzburg in November, 1895; and it may well be that he would not have approved of the story quoted here.

The value of the book is increased by the insertion of a full bibliography at the end of each chapter, by the reproduction of innumerable portraits featuring pioneers in the development of cardiology and by a helpful index divided into separate sections for personal names and subjects. This publication would be an asset to any medical library.

CLINICAL ELECTROCARDIOGRAPHY.

ANY medical monograph the sale of which demands three editions in three languages in eight years is in great demand, or is making frantic efforts to catch up with the latest research information in a rapidly expanding field, or was so obsolete at its inception that more than one leap has been necessary to bridge the delay. The last-mentioned possibility is a rare defect in American authorship, while the second explanation is not true of the field of clinical electrocardiography during the past eight years. Much has been done in finding new recesses of the human form on which or in which electrodes can be placed. Complex mathematical calculations in respect to ventricular gradient, Vector cardiography *et cetera* fill the cardiological journals, but the basic principles of clinical diagrams and utility in electrocardiography remain unchanged. These are well preserved in Scherf and Boyd's handbook "Clinical Electrocardiography", and this is the basic explanation for its material success.¹ Multiple chest leads, although time-consuming and often unnecessary, have come to stay. The distortion of the normal cardiogram by positional variations of the heart is becoming more widely recognized. The wide spectrum of the norm has been realized since the routine electrocardiographic investigation of healthy recruits during World War II. These developments are all accepted in the third edition of this manual. For the rest it is well indexed, provides an extensive bibliography, and is adequately illustrated by reproductions of short strips of somewhat blurred tracings. The revised text can be read without fatigue and is simply expressed, a rarity in electrocardiographic literature. The authors, as clinicians, cannot resist excursions into therapy, psychosomatics, and differential clinical diagnosis; but this is not without value or interest. The whole constitutes an assimilable, practical and adequate presentation according to its title. Such of the field as pertains to the senior undergraduate, or even to the general physician, is pleasantly traversed in a semi-conversational style, strongly reminiscent of the Viennese post-graduate class of better days, with frequent descriptions of relevant patients. He who dubs himself a cardiologist must nowadays submerge himself deeper still in the duller electromathematics of modern American cardiology.

¹"Clinical Electrocardiography", by David Scherf, M.D., F.A.C.P., and Linn J. Boyd, M.D., F.A.C.P.; Third Edition; 1948. London: William Heinemann (Medical Books), Limited. 8½" x 5½", pp. 451, with illustrations. Price: 30s.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Factors Regulating Blood Pressure: Transactions of the Second Conference, January 8-9, 1948, New York", edited by B. W. Zweifach and Ephraim Shorr. New York: Josiah Macy, Junior, Foundation. 9" x 6", pp. 172, with illustrations. Price: \$2.75.

The full report of a conference.

"Manual of Urology", by R. M. LeCompte, M.D., F.A.C.S.; Fourth Edition; 1948. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9" x 6", pp. 326, with 58 illustrations. Price: 30s.

The fundamentals of urology described for the beginner without extended discussions, case reports or references.

"Physician's Handbook", by John Warkentin, Ph.D., M.D., and Jack D. Lange, M.S., M.D.; Fifth Edition; 1948. California: University Medical Publishers. 6½" x 4", pp. 300, with illustrations. Price: \$2.00.

A pocket reference book of diagnostic procedures and factual data for the physician.

"Primary Anatomy", by H. A. Cates, M.B.; 1948. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9" x 6", pp. 494, with 392 illustrations. Price: 45s.

A text-book for non-medical students "more complete than the usual elementary anatomy, yet not so complex as the regular medical text".

"The Search for Health", by D. Stark Murray, B.Sc., M.B., Ch.B.; 1948. London: Watts and Company, Limited. 6½" x 4", pp. 172, with 19 illustrations. Price: 2s. 6d.

Deals with bacteria and man and is intended for non-medical persons.

"Bone Marrow Biopsy: Hematology in the Light of Sternal Puncture", by S. J. Leitner, M.D., English Translation Revised and Edited by C. J. C. Britton, M.D., Ch.B., D.P.H., and E. Neumark, M.B., B.S. (London), M.R.C.S., L.R.C.P.; 1949. London: J. and A. Churchill, Limited. 9½" x 6½", pp. 450 with 194 illustrations some of them coloured. Price: 42s.

Intended for practical clinical use.

"Ocular Signs in Slit-Lamp Microscopy", by James Hamilton Daggart, M.A., M.D., (Cantab.), F.R.C.S. (England); 1949. London: Henry Kimpton. 9" x 5", pp. 132, with 93 illustrations. 85 coloured. Price: 21s.

Deals with the clinical aspects of slit-lamp microscopy.

"An Introduction to Cardiology", by Geoffrey Bourne, M.D., F.R.C.P.; 1949. London: Edward Arnold and Company. 8½" x 5½", pp. 276, with 65 illustrations. Price: 18s.

An attempt to portray the chief aspects of cardio-vascular disease, the underlying laws and tendencies which mould clinical opinion being stressed.

"Some Victorian Portraits and Others", by Hilda Martindale, C.B.E.; 1948. London: George Allen and Unwin, Limited. 8½" x 5½", pp. 110, with illustrations. Price: 10s. 6d.

The author, a social worker, writes about twelve persons who have been an inspiration to her in her work.

"Joseph Lister: The Friend of Man", by Hector Charles Cameron; 1948. London: William Heinemann (Medical Books), Limited. 8½" x 5½", pp. 194, with illustrations. Price: 17s. 6d.

A short biography written by the son of one of his life-long friends.

"Industrial Hygiene and Toxicology", edited by Frank A. Patty. Volume 1; 1948. New York: Interscience Publishers, Incorporated. 10" x 6½", pp. 564, with few illustrations. Price: \$10.00.

Intended for all persons interested in safeguarding the health and welfare of working people and in improving the working environment.

"Pathology", edited by W. A. D. Anderson, M.A., M.D., F.A.C.P.; 1948. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 10" x 6½", pp. 1472, with 1183 illustrations, some of them coloured. Price: £5 12s. 6d.

A text-book containing 46 chapters which are the work of 32 collaborators.

"Human Biochemistry", by Israel S. Kleiner, Ph.D.; Second Edition; 1948. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 9½" x 6½", pp. 656, with 77 illustrations, some of them coloured. Price: 52s. 6d.

The book is an attempt to bring home to the student the clinical aspects of biochemistry without usurping any clinician's domain and without neglecting the fundamentals.

The Medical Journal of Australia

SATURDAY, MARCH 5, 1949.

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THE ROYAL COLLEGE OF OBSTETRICIANS AND GYNÆCOLOGISTS AND ITS REGIONAL COUNCIL IN AUSTRALIA.

In the twenties of this century the need was felt in England for an organization which would bring obstetrics and gynaecology into the close relationship with one another which they ought to have. For many years they had been taught as separate subjects. The tendency was to couple gynaecology with surgery and to divorce it from its natural partner, obstetrics. It was for gynaecological conditions, ovarian and uterine tumours, that the abdomen was first opened. The pioneer work of Ephraim McDowell, of the United States of America, and of Lawson Tait and his colleague Spencer Wells opened up a new vista to surgeons. When Lister made the opening of the abdomen comparatively safe surgeons began to operate for non-gynaecological abdominal conditions. The whole abdomen was the province of the general surgeon; there were no gynaecologists as we know them today and it is not to be wondered at that gynaecology became a department of general surgery. But experience and vision made practitioners of medicine realize that many of the disabilities of their women patients arose from the natural processes of pregnancy and parturition. This was especially true in regard to displacement and prolapse of the viscera in the female pelvis. The relationship between pregnancy and parturition on the one hand and gynaecological disabilities on the other is reflected in the aphorism that "good midwifery is preventive gynaecology". Bland Sutton, who was a gynaecologist as well as a general surgeon, perceived this and wrote about it, but it was Blair Bell who led the way, or, shall we say, published the banns to what has been described as the remarriage of the unnaturally divorced obstetrics and gynaecology. Obstetrics and gynaecology are described in the "Combined Textbook of Obstetrics and Gynaecology" as not only united to each other, but as affording what is generally regarded as the best example of the essential unity of medicine and surgery. It was Blair Bell and his colleagues who brought about the incorporation as a company of the British College of Obstetricians and Gynaecologists. Perhaps it

should be explained that the union of obstetrics and gynaecology in a college devoted to their study and practice is not to be confused with the urgent desires of many obstetricians to improve the standard of obstetrical practice. The establishment of a college devoted to obstetrics has been mentioned. Reference to THE MEDICAL JOURNAL OF AUSTRALIA of July 12, 1924, will show, for example, that the late J. W. Dunbar Hooper suggested that one board of examiners in obstetrics should be established for the whole of Australia and that this board should be called the "College of Obstetrics in Australia". He thought that this college should grant a diploma commensurate with the dignity and importance of the subject and of a standard as high as that of the Fellowship of the Royal College of Surgeons of England. Many other authors thought that action should be taken to raise the standard of obstetrical practice, but as far as can be discovered ideas like those of Dunbar Hooper were advanced by no other Australian.

The British College of Obstetricians and Gynaecologists was incorporated in 1929 under the Companies Act, 1908-1917, as a company limited by guarantee and not having a share capital; the word "limited" was omitted from the name by licence of the Board of Trade. The enthusiasm with which the new college was received and the progress made by it are matters of common knowledge. It received its royal charter in 1947 and has since then been known as the Royal College of Obstetricians and Gynaecologists. The objects of the College are stated in the Articles of Association to be "the encouragement of the study and the advancement of the science and practice of obstetrics and gynaecology the maintenance of the honour and interests of the members of the medical profession engaged in the practice of obstetrics and gynaecology and the co-operation of such members of the medical profession for their mutual assistance and support in all matters affecting them in their professional capacity". Several means by which the objects may be attained are mentioned; they cover a wide ground. Thus the College may take part in the examination of students seeking admission to the British register of practitioners; it may issue diplomas, certificates or similar recognition of special knowledge in obstetrics and gynaecology; it may hold meetings or conferences, either alone or in conjunction with other bodies or associations, on subjects connected with its declared objects; it may equip, manage and carry on libraries; it may produce lists and registers of obstetricians and gynaecologists; it may publish a journal; it may encourage research by grants from its funds and may award scholarships and prizes; it may take part in legal proceedings "civil or criminal in which in the opinion of the College the honour or interests of any member of the College in his professional capacity or any question of professional principle is or are involved"; it may establish benevolent funds for certain persons; it may undertake and carry out the execution of certain types of trusts; it may take any other means that "may seem to the college incidental or conducive to the promotion or carrying out" of any of the activities named.

In Australia a few men and women were stirred by the vision of the College and R. Marshall Allan, of Melbourne, J. C. Windeyer, of Sydney, and T. G. Wilson, of Adelaide, were among the more enthusiastic. Some of the younger generation felt that the creation of the new College and

its activities were very remote from them—they were not easily moved by what happened thirteen thousand miles away. It was owing to Marshall Allan's influence that the idea gradually took hold, and in 1938 wide support was given to what may be regarded as a movement to combine obstetrics and gynaecology as a living and organic combination of anatomy and physiology with the principles and practice of medicine and surgery. No one will deny that the practising obstetrician and gynaecologist must be at once anatomist, physiologist, pathologist, endocrinologist, physician and surgeon. A statement something like this can probably be made about most specialists and specialities in medicine, but in obstetrics and gynaecology the several branches mentioned seem to be more obviously needed than in others. Unhappily Marshall Allan died while his work for the Royal College of Obstetricians and Gynaecologists was still incomplete, but not before he had become a Vice-President of the College. His work was carried on by J. C. Windeyer, T. G. Wilson and B. T. Mayes with the support and help of leading specialists in the several States. By 1947 plans were so far advanced that Sir William Fletcher Shaw, of Manchester, was deputed by the Royal College to visit Australia and to conduct an election for a Regional Council of the College in Australia. It is significant that Australian Fellows and Members chose to be content with their attachment to the British College, and that they did not attempt to form an Australian or an Australasian college. It was probably thought that the numerical strength of Australian obstetricians and gynaecologists did not warrant the establishment of a college in this country, and there is no doubt that the maintenance of the prestige of the Royal College in Britain was regarded as a worthwhile activity for Australian Fellows and Members. One possible effect of this attitude of mind is that before long the College will consist of a Parent Body in England with Branches in every unit of the British Commonwealth of Nations—a most desirable state of affairs. Be that as it may, the establishment of the first Australian Regional Council must be recorded. This took place in March, 1947, at a dignified and solemn assembly held at the Wallace Theatre in the University of Sydney, at which Sir William Fletcher Shaw acted on behalf of the Council of the Royal College in England. The first Council consisted of F. A. Maguire of Sydney (Chairman), Professor B. T. Mayes of Sydney (Honorary Secretary and Treasurer), R. I. Furber of Sydney, T. Dixon Hughes of Sydney, the late Arthur Wilson of Melbourne, Ivon Hayes of Melbourne, R. C. Worcester of Melbourne, the late John Green of Melbourne, Brian Swift of Adelaide, W. F. Joynt of Adelaide, and Professor G. Shedden Adam of Brisbane. At a later date W. K. McIntyre of Launceston and G. Ashburton Thompson of Perth were coopted to the Council. State committees were formally inaugurated in May, June and July, 1947, by F. A. Maguire, who visited each capital city for the purpose. The Australian Regional Council was gracefully recognized by the Council of the College when it invited F. A. Maguire, the Australian Chairman, to be guest speaker at the annual dinner in London in October, 1947.

In the issue of December 4, 1948, an account of a meeting arranged by the Victorian Fellows and Members of the Royal College of Obstetricians and Gynaecologists, "the first meeting of its kind to be held in Australia", was published; and in the present issue there appears a series

of papers read at a meeting of New South Wales Fellows and Members, together with the discussion. We welcome these signs of corporate activity of the Australian Regional Council.

Current Comment.

A LAYMAN'S CONTRIBUTION TO NEUROLOGY.

In the early days of the second World War, when Great Britain was beginning to marshal her economic resources to meet the national emergency, a campaign was organized to salvage all waste paper for conversion into pulp. In amongst some of the rubbish set aside for collection, a sheaf of papers was found consisting of letters, diaries and other manuscripts which formerly belonged to the Lady Augusta d'Ameland and her son, Augustus d'Esté. This son now claims our attention, because he suffered from an obscure nervous disease which interfered so persistently with his enjoyment of life that until shortly before his death in 1848 he kept a careful record of his symptoms in his personal diary. The various entries relating to his disease extended over a period of more than twenty years; and it is claimed that the observations recorded in this recently recovered diary constitute the earliest clinical account of disseminated sclerosis. As the material rescued from the rubbish heap in 1940 was found to contain several passages of medical interest, it was handed over to the Royal College of Physicians of London, and one of its Fellows, Dr. Douglas Firth, who made a tentative diagnosis of the aristocratic patient's condition and recognized the historical significance of his introspective annotations, incorporated the diary in a small book, "The Case of Augustus d'Esté".¹ From some of the other papers the author has been able to piece together scraps of information about the patient's early life in the higher circles of English society, where his outlook was considerably restricted by the uninspiring influence of an adoring mother.

The author gives a short account of a few unimportant events in the even less important careers of these two psychoneurotic personalities who came by chance to have a family connexion with the reigning king of England. It begins in 1793 with the clandestine marriage of the young Prince Augustus Frederick, the sixth son of George III, to Lady Augusta Murray, daughter of the Earl of Dunmore, when they met in Rome while travelling on the Continent. As soon as the King learnt of his son's indiscretion the order was given for his immediate return to England. The Prince dutifully obeyed the summons, but shortly after the arrival of his wife a second marriage ceremony was enacted at Saint George's Church, Hanover Square, which so enraged the monarch that he gave instructions for the annulment of the marriage under the provisions of the *Royal Marriages Act*, thus rendering illegitimate the boy, Augustus Frederick, who was born in January, 1794, and who was later to provide an interesting case history for the edification of the medical profession.

The troubled existence of Sir Augustus d'Esté seems to have been largely occupied in vainly striving to counteract his father's determined efforts to disclaim any royal privilege for Lady Augusta and himself, and in seeking relief from the distressing symptoms which were the concomitant of his mysterious complaint. For years he made periodical visits to one health resort or another, consulted all the distinguished physicians of the day, and then tried desperately to reconcile all the conflicting opinions tendered to him as an exposition of the real cause and proper treatment of a disease which unfortunately happened to be entirely beyond the comprehension of his advisers. However, the one and only contribution of Sir Augustus to posterity was the diary in which he

¹"The Case of Augustus d'Esté", by Douglas Firth, M.A., M.D. (Cantab.), F.R.C.P. (London); 1948. Cambridge: University Press. 7½" x 4½", pp. 70. Price: 6s.

recorded the progress notes of his illness in such a manner that the description is unmistakably pathognomonic of a disease not clearly understood until Charcot accurately defined its clinical and pathological manifestations in 1868. It is for this reason alone that the book may be of interest to medical practitioners. But it is not the first instance in which a layman has earned priority by giving a clear picture of a rare and obscure disease: in his autobiography first published in 1759, the Earl of Clarendon described the terminal illness and sudden death of his father from coronary sclerosis with anginal symptoms. Firth has included a youthful portrait of the patient and specimens of his handwriting as evidence of his physical deterioration, a genealogical table to show his family relations, and helpful footnotes to amplify statements in the text. History has been described as a dust heap. Here is the story of a dust heap that yielded history.

THE TOXIC EFFECTS OF CALCIFEROL

For twenty years it has been known that the administration of the purified anti-rachitic factor can cause toxic symptoms when given in large doses. Some of the early reports did not seem to attract much attention, although serious results have followed the production of hypervitaminosis of this type. It appears, too, that the reports of toxic symptoms associated with high dosage of the crystalline product calciferol have been vague in their references to any untoward effects. S. T. Anning, J. Dawson, Doris E. Dolby and J. T. Ingram have reviewed this literature and have also examined the question of calciferol toxicity as illustrated in a series of 200 persons treated with this substance in high dosage¹. As late as ten years ago the advice on the subject was rather conflicting and it seems as if no clear distinction was drawn between the effects on adults and on children. Recently attention has been drawn to the risks in children. The present communication concerns 200 patients from a dermatological department. The majority of them were over thirty years of age. The dosage of the concentrated vitamin used varied from 50,000 to 150,000 international units, and the relationship of the dose to body weight was noted. In addition ultraviolet light therapy was given to some of the patients; these consisted of equal numbers of those who showed toxic effects and those who did not. The resources of a biochemical department were used and the serum calcium content was measured, as well as the serum protein content and the amount of diffusible calcium. The inorganic phosphorus content was also determined and renal efficiency tests were carried out when indicated. Experiments were made on rabbits with renal damage to find out the result of coincident dosage with calciferol.

Toxic effects were observed in 19% of the patients, the chief being thirst, anorexia, vomiting, fatigue, malaise, nausea, headache and a number of other symptoms of which the majority were those of vague illness. In addition, a marked departure from the normal ratio of diffusible to total calcium was considered to be due to toxic action, and was classed as "biochemical toxicity". The daily dose taken by all patients who showed any of these signs or symptoms was, at the time of their onset, 100,000 to 150,000 units daily. It was found that a statistical connexion existed between the size of the daily dose in relation to the body weight and the occurrence of toxic signs. To the list given above should be added abdominal pain, which is worth special mention, as it was severe in two cases; it also affected three patients who were discarded from the series since they entered other hospitals and thus passed from observation. It is strange that three of these five patients were thought to have abdominal emergencies and three were submitted to laparotomy. No fatalities occurred in this series, though the literature contains at least ten accounts of death occurring from lesions due to *D*-hypervitaminosis. The most striking finding in these cases was calcification of the renal tubules, a change recorded in some of the animal experiments

carried out by a number of workers. Renal function was therefore carefully investigated when albuminuria or hypertension appeared or when other indication for further tests was found. Estimations such as that of the blood-urea nitrogen content were not helpful as warnings. The most valuable sign of possible intolerance in the present series was the rising of the diffusible serum calcium level; the critical level was thought to be 7.5 milligrammes per 100 millilitres or higher. No special findings were observed in these people by radiological or electrocardiographic examinations. Further observations are to be published about changes in calcium balance.

On the basis of work done to date the authors think that calcium excreted during the period of administration of calciferol is greater than that ingested, and that the phosphorus in the urine is increased during dosage, but returns to normal level afterwards. Calciferol mobilizes calcium, and in large, that is, toxic doses, acts as a decalcifying agent. No serious evidence of derangement of renal function was found, though albuminuria and glycosuria were noted as temporary signs, the latter being of the renal type. The authors mention the possibility of individual susceptibility to calciferol, and point out that preexisting disease, especially renal disease, may be important. The existence of deficiency of the *D* vitamin introduces another factor which is not so relevant in the present series, owing to the particular type of patient undergoing treatment. Though this investigation is not in all senses complete, it is of interest as showing that the effects of this concentrated vitamin need to be watched, even when it is given to a series of persons attending a dermatological clinic.

THE MEDICAL ANNUAL.

For the well-known pathological tendency of medical practitioners either to know more and more about less and less or to know less and less about more and more, there is no better corrective than the annual administration of "The Medical Annual". There is nothing quite like "The Medical Annual" in the breadth of its scope and the amount of useful information supplied. Among the reasons for its success are the interest shown in the most everyday subjects, the skilful presentation of significant specialized knowledge to bring it within the ken of the general practitioner or the worker in other fields, and the judicious balance between summaries of current literature and more comprehensive surveys of particular subjects which have come into prominence. The appearance of "The Medical Annual" for 1948¹ brings the series into its sixty-sixth year of publication, the usual high standard being maintained in this volume by the editors, Sir Henry Tidy and A. Rendle Short, and their distinguished band of collaborators. Perhaps the most comprehensive article is that on B.C.G., contributed by W. H. Tytler, David Davies Professor of Tuberculosis in the Welsh National School of Medicine; it is a careful and indeed exhaustive survey of a topical and important subject. T. P. Kilner brings up to date our knowledge of the treatment of cleft lip and palate (he dislikes the term "hare-lip") in an article illustrated with excellent "before and after" photographs. Other subjects receiving special attention are the treatment of cutaneous tuberculosis with vitamin *D*₂, epiphyseal disorders (T. P. McMurray), the surgery of the heart and great vessels, and the Rhesus factor. The editors contribute the usual informative survey of their respective fields in the introduction. A wide range of medical literature is covered, including many papers by Australians. The volume, in short, follows the tradition of the series, which constitutes in itself a reference library, especially for those who realize the dangers of a circumscribed medical outlook. Those who do not know this work are advised to acquire as soon as possible what in years gone by we have called the "Medical Annual" habit.

¹ "The Medical Annual: A Year Book of Treatment and Practitioner's Index", edited by Sir Henry Tidy, K.B.E., M.A., M.D. (Oxon.), F.R.C.P., and A. Rendle Short, M.D., B.S., B.Sc., F.R.C.S.; 1948. Bristol: John Wright and Sons, Limited. London: Simpkin Marshall (1941), Limited. 8" x 5½", pp. 566, with illustrations, some of them coloured.

² The Quarterly Journal of Medicine, July, 1948.

Abstracts from Medical Literature.

PÆDIATRICS.

Immunization in Early Infancy.

JEAN V. COOKE (*The Journal of Pediatrics*, August, 1948) set out to investigate the widely held belief that immunization of children during early infancy is an unreliable procedure because of poor antibody formation. The infants tested were healthy babies, mostly under the age of six months. At the first visit blood was drawn and tested for diphtheria and tetanus antitoxins and a subcutaneous injection of combined diphtheria and tetanus toxoid was given. A second injection of the same material was given two months later, and one month after this a blood sample was again examined for the titre of diphtheria and tetanus antitoxin. No unusual local or general reactions followed the injections. The development of tetanus antitoxin was excellent and was as good in infants under the age of three months at the time of immunization as in older infants. The results with diphtheria were more variable; the development of adequate antibody levels was found to depend on whether the baby had inherited a temporary passive immunity. Approximately one-third of the babies had such an immunity, and of these only 30% under the age of three months responded satisfactorily to the diphtheria immunization. Of the group of infants with no passive immunity 82% of those under the age of three months responded satisfactorily. Of children between the ages of six and fourteen months there was satisfactory antibody formation in 95%. The authors conclude that the young infant will respond to immunization for tetanus and for diphtheria unless it has a passive immunity. Because the risk to the young infant in a modern community is so small, they recommend that immunization be deferred until after the age of six months. They emphasize the fact that the risk of pertussis to the young infant is very great and point out that recent work by Sako indicates that pertussis immunization in early infancy is as effective as in late infancy. The growing tendency to depend on combined diphtheria-pertussis tetanus toxoids is deprecated, for there are definite advantages in immunizing against diphtheria later in infancy and against pertussis early in infancy.

SALMON R. HALPERN and DORIS HALPERN (*The Journal of Pediatrics*, July, 1948) have investigated the response of the young infant to pertussis immunization, attempting to repeat the work of Sako. The infants varied in age from two weeks to six months, but the majority were aged one month when the immunization was commenced. An alum-precipitated phase one vaccine was used, standardized to contain 40 billion organisms per millilitre. A total of one millilitre was given, divided into three doses given at monthly intervals. With a dry needle the material was injected deeply and distally into the deltoid, the needle finally being cleared by a small amount of air before withdrawal. There resulted a certain amount of fever and local induration, but it was rarely troublesome. In three infants a small

abscess developed, but it did not inconvenience the children and resolved spontaneously. Immunity was measured by an agglutination test, the skin test of Flosdorf and a two-year check on the incidence of whooping-cough. The skin test and the agglutination test showed a high degree of correlation and both showed that the infants responded satisfactorily to the immunization. The clinical check showed that none of the children developed pertussis within the two-year period. The skin and agglutination tests were done three to four months after the last injection of vaccine.

Glutamic Acid.

FREDERIC ZIMMERMAN and BESSIE BURGE MEISTER (*The American Journal of Psychiatry*, April, 1948) have studied the effect of glutamic acid upon 30 young subjects, 14 being children and adolescents with convulsive disorders, seven of whom were mentally retarded; 16 were mentally retarded without convulsions, so that there were 23 mentally retarded patients. Thirty-seven patients, all mentally retarded and some with convulsive disorders, were used as a control group. The ages varied from five to sixteen years, the intelligence quotient from 38 to 131. The quantity of glutamic acid used ranged from 6 to 24 grammes per day given in three divided doses. Gradually increasing doses were used, until a stage of increased psychic and motor activity was evident. The tests used were a revised Stanford-Binet and performance tests. The trial was conducted over a period of twelve months of treatment. The average increase was approximately 11 points for the twelve months, this being twice as fast as that expected of children with average intelligence. The average increase showed that 8.6 points were gained in the first six months and 2.2 in the second six months. The results do not indicate that an absolute ceiling has been reached, nor is it clear whether the accelerated activity will be maintained. Careful observation and management seem necessary in this therapy to achieve the maximum result without the dissipation of energy in excessive distractibility.

Increased Oral Feeding in Infantile Diarrhoea.

ARTHUR W. CHUNG (*The Journal of Pediatrics*, July, 1948) has investigated the absorption of foodstuffs by children with diarrhoea when fed different amounts by mouth. He felt that some of the deaths that occurred from infantile diarrhoea were actually due to nutritive failure. He suspected that the policy of an initial period of starvation followed by very cautious increases of food, with a return to starvation if the stools became looser or more frequent, made it very difficult to avoid serious under-nutrition. He felt that the state of the child and not the condition or frequency of the stools should be the important factor in determining treatment. He therefore carried out metabolic studies on a group of infants with diarrhoea whose ages ranged from twelve days to three months, all initially presenting a picture of dehydration, acidosis and toxicity requiring the parenteral administration of fluids. For the purpose of the investigation the babies were fed at different times on an evaporated milk mixture in amounts varying from com-

plete starvation up to the full caloric requirement, quite irrespective of the stage of their diarrhoeal disease. The food, urine and dried faeces were analysed for ash—sodium, potassium, chloride, calcium—fat and nitrogen. It was found that effective absorption of all these food ingredients took place despite the diarrhoea, and that with a larger oral intake the absolute amount absorbed was greater, although faecal loss, too, was greater. From the point of view of absorption, therefore, there would seem to be no justification for restricting food in infantile diarrhoea. At the same time, with the cooperation of Bohumila Viscorova, the author compared the effect of early oral feeding with that of early starvation on the course of the disease. Of a series of 115 patients with infantile diarrhoea, alternate patients were offered full feedings from the start, the remainder being placed on a régime of oral starvation. The correction of shock, dehydration and acidosis was given immediate attention in all cases by the parenteral administration of fluids. It was found that the duration of diarrhoea was not prolonged by feeding, although the stools were larger, more solid and more frequent. Weight gain was better in the fed group. The authors conclude that feeding by the oral route should be used to the greatest extent in infantile diarrhoea, but emphasize the fact that they are not urging it as a substitute for parenteral electrolyte and food administration when this is needed. Their point is that the best parenteral therapy has its shortcomings, and that once vomiting has been controlled, as it usually is by initial adequate parenteral electrolyte replacement, oral feeding should be used as far as possible, for although it increases the stools there is more satisfactory food absorption, better weight gain and no prolongation of the illness.

Slipped Epiphysis in the Adolescent Hip.

P. H. MARTIN (*The Journal of Bone and Joint Surgery*, January, 1948) states that the blood supply to the capital epiphysis of the femur can come from only three sources: (i) a few small vessels which penetrate the cartilage plate from the neck, (ii) the vessels in the *ligamentum teres*, (iii) the vessels in the periosteum of the neck, which in the child is much thicker and more vascular than in the adult. The vessels penetrating the cartilage are destroyed when the epiphysis slips. The vessels in the *ligamentum teres* are small and may be absent. The periosteal vessels are also torn, at least on the anterior aspect of the neck, as the head slips posteriorly. Thus, at best, the blood supply of the epiphysis is meagre after slipping occurs. However, avascular necrosis is practically never encountered in untreated patients, although occasionally degenerative changes are seen in the articular cartilage, which may be secondary to deficient circulation in the underlying bone. The author considers that most poor results are caused by improper treatment and are due chiefly to avascular necrosis in the epiphysis, following further damage to its blood supply through the *ligamentum teres* and the periosteum on the posterior and inferior aspects of the neck. Manipulation should be condemned except for acute traumatic conditions and it should be gentle. If reduction is not easy, closed methods should be

abandoned. Patients in the so-called pre-slipping stage and those with minimal slipping (less than one centimetre) are best treated by nailing *in situ* without reduction. When displacement is by more than one centimetre and is gradual or has existed longer than two weeks, open reduction should be carried out without preliminary manipulation. This must be accomplished with due respect for the blood supply of the epiphysis. The author discusses the technique of open reduction. After the epiphysis has been realigned, it is fixed by a Smith-Petersen nail, introduced over a guide wire through a smaller lateral incision. The periosteum is carefully sutured and attached to the edge of the epiphysis, the neck being completely covered again with synovial membrane. The author has used this method in eight cases since 1943. He states that the series may be too recent to indicate possible future arthritic changes, but the danger of aseptic necrosis is past and this is the cause of most of the poor early results and the chief factor in the development of serious later osteoarthritis. Six patients have excellent results, with almost normal function as regards limp, pain and motion. The author states that for old united lesions, if there is a good hip joint, intertrochanteric osteotomy may be beneficial. Later in life arthroplasty offers much improvement for old arthritic hips and especially for the cases with ankylosis.

ORTHOPÆDIC SURGERY.

Pseudarthrosis in the Lumbo-Sacral Part of the Spine.

M. CLEVELAND, D. M. BOSWORTH AND F. R. THOMPSON (*The Journal of Bone and Joint Surgery*, April, 1948) review the incidence of pseudarthrosis in fusions of the lumbo-sacral vertebrae. In this series of cases 647 operative procedures were carried out on 594 patients. Pseudarthroses developed in 119 instances or 20%. No results were accepted as regards the solidity of fusion with less than one year of follow-up, unless controlled both by lateral radiographs in flexion and extension and by antero-posterior radiographs in right and left bends. Among the 594 patients, 1329 spinal intervals were bridged. Pseudarthrosis occurred at 161 intervals or 12.1%. The authors consider that this represents the relative inefficiency of this type of surgery. It was found that the percentage of pseudarthrosis rose rapidly as the number of spinal intervals, which were crossed, increased. When the fifth lumbar interval alone was bridged, pseudarthrosis developed in only 3.4%; when fusion covered the third, fourth and fifth lumbar intervals the proportion of pseudarthrosis was 33.3%. Of the 119 patients in whom pseudarthrosis developed only 35 returned to the authors for repair. Many of the remainder had symptoms insufficient to demand surgical treatment. Most of the pseudarthrosis was located at the fourth lumbar interspace. The authors conclude that the percentage of pseudarthrosis developing in spine-fusion operations in the lumbo-sacral region may be reduced by an adequate amount of bone of good texture, firmly implanted and free from infection. The possibility of pseudarthrosis should be

discussed with the patient before operation in every instance, so that he is forewarned, and so that consent for repair may more readily be obtained when necessary. One should avoid covering any greater number of spinal intervals than are absolutely essential in performing a fusion at the lumbo-sacral juncture, but the fusion should always extend to and include the sacrum. For statistical and practical purposes, it is useless to report a series of spine fusions at the lumbo-sacral juncture without control of the series by biplane radiographs, taken with the patient in flexion and extension, and with right and left bends. The radiographs should then be accurately superimposed. Furthermore, even with such radiographs, a few instances of pseudarthrosis in any series will fail to be recognized.

Treatment of Sciatic Pain by Immobilization in a Plaster Jacket.

F. C. DURBAN (*The Journal of Bone and Joint Surgery*, August, 1948) states that, between 1936 and 1945, 525 patients with sciatic pain were treated at the Princess Elizabeth Orthopaedic Hospital, Exeter. Of these, 225 had neurological signs and they were selected for review; 147 were traced. Of these, 123 were treated by means of plaster jackets and 24 by other methods. The late results of treatment in the two groups were about the same, roughly one-third being "cured", one-third "relieved" and one-third "not relieved". Examination of the immediate results suggests that protection by means of a plaster jacket had at least a palliative effect, relieving acute symptoms and allowing early rehabilitation. Moreover, it is emphasized that by limitation of the investigation to cases of sciatica with evidence of nerve root pressure only the more severe cases have been included. Permanent relief after immobilization in plaster was greatest when the duration of symptoms was short, and when the patient was treated during his first attack. It was least in patients who showed all three signs of nerve root pressure—diminished ankle jerks, hypoaesthesia, and muscle hypotonicity. The author found that absence of tendon reflexes due to nerve root pressure and areas of hypoaesthesia tend to remain permanently, but diminution of reflexes and loss of muscle power may disappear.

Traumatic Dislocation of the Hip Joint.

J. R. ARMSTRONG (*The Journal of Bone and Joint Surgery*, August, 1948) has reviewed 100 cases of dislocation of the hip, many of the patients having been reexamined at intervals ranging from two to five years after injury. There were 46 simple dislocations, 43 dislocations with fracture of the acetabular rim, seven dislocations with fracture of the acetabular floor, and five dislocations with fracture of the femoral head. Complete recovery, as judged by clinical and radiographic examination, was observed in 76%, 63% and 40% respectively of the first three groups; in no case of dislocation with fracture of the acetabular floor was recovery complete. Only in one case did *myositis ossificans* develop, and that was the only case in which the patient was treated by "massage and movements" throughout the first ten weeks after injury. The author states that

avascular necrosis of the femoral head was recognized in a smaller proportion of cases than had been expected, but the follow-up review extended only to four years after injury and the incidence of this complication cannot be assessed unless the follow-up period is at least five to ten years. Early traumatic arthritis developed in 26% of cases—in 15% of simple dislocations, 25% of dislocations with fracture of the acetabular margin, 60% of dislocations with fracture of the femoral head, and 100% of dislocations with fracture of the acetabular floor. The author believes that when central or posterior dislocations are accompanied by fracture of the acetabular floor, early arthrodesis is the treatment of choice. Displacement of marginal acetabular fragments is usually corrected by manipulative reduction or by traction. Sciatic paralysis in dislocation of the hip joint is nearly always due to damage of the nerve by a displaced acetabular fragment. In such cases, if the fragment is not replaced accurately by manipulation or traction, operative reduction is urgently indicated.

The Intervertebral Ligaments as a Source of Segmental Pain.

D. C. SINCLAIR, W. H. FEINDEL, G. WEDDELL AND M. A. FALCONER (*The Journal of Bone and Joint Surgery*, August, 1948) state that experimental observations did not support the contention of Lewis and Kellgren that stimulation of an interspinous ligament by injection of hypertonic saline is capable of causing referred pains in the distribution of the spinal segment innervating the ligament. In this experimental study 6% saline solution was injected in various sites and at various depths in the lumbar and thoracic regions of the backs of a number of volunteers. The injections were made on the X-ray table, the needle being inserted through a small intradermal button of 1% "Novocain" solution. The maximum quantity of saline injected in any one situation was usually 0.3 millilitre. The authors found that the importance of radiographic control was soon established, because without its aid it was found very difficult to predict with accuracy the position of the needle point. Indeed, in every case it was found necessary to confirm the position of the needle point before injection, instead of simply using radiography as a check. They state that in the thoracic region, injections made as nearly as possible in the mid-line caused referred pain much less readily than injections to one side of the mid-line. In the lumbar region injection of as much as 0.6 millilitre of hypertonic saline into the interspinous ligament in the mid-line failed to cause referred pain; it caused only local pain in the back. Only when the needle point was carried laterally to a distance of about three centimetres was referred pain caused in one case by injection of 0.3 millilitre of saline at a depth of two centimetres. Repeated failure to produce segmental pain by the injection of relatively large quantities of saline exactly in the mid-line of the lumbar region constitutes evidence against Kellgren's theory. The authors conclude that in this series of experiments the results were consistent with the hypothesis that referred pain is caused by direct stimulation of nerve trunks, and inconsistent with the view that it is due to the stimulation of interspinous ligaments.

The Royal College of Obstetricians and Gynaecologists.

NEW SOUTH WALES STATE COMMITTEE.

THE first clinical meeting of the New South Wales Fellows and Members of the Royal College of Obstetricians and Gynaecologists was held on May 28 and 29, 1948, at the Women's Hospital, Crown Street, and Sydney Hospital, respectively.

The Nervous and Chemical Control of the Uterus; Induction of Labour.

DR. F. A. MAGUIRE read a paper entitled "The Nervous and Chemical Control of the Uterus" (see page 289).

DR. T. DIXON HUGHES read a paper entitled "A Brief Summary of the Indications for and Methods of Induction of Labour" (see page 291).

DR. T. H. SMALL read a paper entitled "Complications and Results of Induction of Labour" (see page 292).

DR. JOHN CHESTERMAN, in opening the discussion, said that Dr. Maguire's paper had combined the knowledge of the anatomist, physiologist and endocrinologist in a most interesting way, and that by the methods of approach he had indicated would be discovered the safe and certain way of inducing labour. Discussing indications for induction of labour, Dr. Chesterman said that he did not consider post-maturity alone an indication. He referred to a report by Dr. Ivon Hayes, of Melbourne, published in *THE MEDICAL JOURNAL OF AUSTRALIA* a few years earlier, concerning that question. Dr. Hayes had given the results obtained with mother and baby in such matters as duration of labour, mortality and morbidity, comparing two fairly large groups of patients; in one of them labour had been induced because the patients had passed the estimated date of confinement, whereas in the other the patients were allowed to go into labour spontaneously. The results slightly favoured the group that was left alone. Dr. Chesterman said that in his own practice he did not induce labour because the patient's confinement was some days or even weeks "overdue". The main difficulty in such cases was to allay the impatience of the patient and relatives. However, if there was some factor other than post-maturity, particularly conditions such as essential hypertension or impairment of renal function, induction of labour before term might well be indicated. As Dr. Dixon Hughes had pointed out, toxæmia of pregnancy was the chief indication for early induction of labour, and the most difficult in which to achieve success. Dr. Chesterman said that he did not rely in all cases on the method of artificial rupture of the membranes. He believed that, in dealing with any obstetric problem, one should as far as possible have some plan for the next step, in case any procedure to be undertaken should fail to achieve its result. He felt that after artificial rupture of the membranes, the only step available was to "sit tight" and wait, sometimes eventually performing a Caesarean section, which might be needed to escape from the situation created by the rupture of the membranes. After artificial rupture of the membranes, the amniotic cavity was soon invaded by organisms which sometimes adversely affected the baby, whereas after the introduction of bougies or rubber tubing into the uterus the amniotic cavity in his opinion remained uninfected. Dr. Chesterman compared artificial rupture of the membranes for inducing labour with the little girl who had a curl down the middle of her forehead—when it was good, it was very, very good, but when it was bad, it was horrid. However, it was possible to pick beforehand the "horrid" cases to some extent. They comprised patients who were not at term, and *primigravidae* with the fetal head not fixed in the pelvis and an elongated undilated cervical canal. Such conditions were not uncommon—an example was provided by the typical preeclamptic, thirty-four to thirty-eight weeks pregnant—and in such cases Dr. Chesterman still favoured the introduction of bougies. He said that he had read figures comparing the results of artificial rupture of the membranes with other surgical methods of induction of labour, which appeared to show the advantages of artificial rupture of the membranes; but he felt that the patients treated by artificial rupture of the membranes were primarily easier to bring into labour than those treated by surgical induction, the latter perhaps comprising those patients not deemed suitable for artificial rupture of the membranes. Dr. Chesterman believed that careful consideration of each individual case was necessary before a method was decided on. No doubt artificial rupture of the mem-

branes would be considered best in most cases; but in the others the introduction of bougies or coiled rubber tube was better.

In conclusion, Dr. Chesterman said that he had followed Dr. Small's paper with interest, but had not been able to take in sufficiently all the figures presented to make comment. However, his investigations did confirm the opinion that no satisfactory method of inducing labour had yet been found.

PROFESSOR J. C. WINDEYER said that there was still much to learn about the control of the uterus, and as with the female sex in general, one never knew what it was going to do next. Post-maturity was a rare indication for the induction of labour; however, when the fetus appeared to be oversized, one might have to consider some action. Some years earlier, in a series of patients at a hospital, it had been found that in many of the cases classified as post-maturity the patients had delivered small infants. Caesarean sections had been performed for post-maturity and infants weighing less than six pounds delivered.

PROFESSOR B. T. MAYES remarked that he was especially interested in cases in which attempts at induction of labour had failed. Probably the commonest method was artificial rupture of the membranes. What did one do when after that labour did not commence? Professor Mayes considered that there would be a fetal mortality rate of 30% if labour had not commenced within forty-eight hours. As was now well known, the fetus made respiratory movements while in the uterus, and thorotrast injected into the amniotic sac was seen in the fetal thorax. Therefore, if infection of the amniotic sac followed artificial rupture of the membranes, fetal infection was an accomplished fact. Professor Mayes on that account recommended the prophylactic use of chemotherapy when the membranes were artificially ruptured.

DR. MARGARET MACKIE quoted Dr. A. M. Wilson as saying that in cases of post-maturity even a small baby might die in the uterus. Dr. Wilson believed in emptying the uterus of a patient whose period of gestation had extended past the expected time, who was losing weight and whose abdomen had ceased to enlarge. Comparing the results of induction of labour by the insertion of tubes and by artificial rupture of the membranes, Dr. Mackie gave it as her opinion that artificial rupture of the membranes was the better method.

DR. R. B. C. STEVENSON said that where facilities were available, culture material should be taken from the cervix of all patients suffering from toxæmia of pregnancy for whom it was likely that resort would be had to induction of labour. In that way one was pre-armed. What method of delivery was to be chosen when pathogenic organisms were found? The "ripe" cervix was a well-recognized entity, and in most cases when the cervix was not "ripe" induction of labour was best avoided. During the last year only three Caesarean sections had been performed at the Women's Hospital, Crown Street, on patients suffering from toxæmia of pregnancy. He wondered whether in all the other patients whose labour was induced the cervix was "ripe".

DR. GORDON B. LOWE, from the chair, said that the more experience one had, the less inclined one was to induce labour. It was the experience of all that even with the "ripe" cervix induction was often hazardous. He believed that there was a post-mature fetus, though it was difficult to estimate the size of the fetus in the uterus. In a considerable proportion of patients whose gestation continued past term the fetus died undelivered. One had to be cautious about the application of induction of labour, and that especially applied to the teaching of students, as the inexperienced would "have a fly" at anything.

Tumour Registry.

DR. K. A. MCGARRITY read a paper entitled "Tumour Registry" (see page 295).

Errors in Gynaecology; Vaginal Hysterectomy-Colporrhaphy; Treatment of a Vesico-Vaginal Fistula.

DR. R. I. FURBER read a paper entitled "Personal Errors in Gynaecology" (see page 296).

DR. A. L. WATSON read a paper entitled "Vaginal Hysterectomy-Colporrhaphy" (see page 297).

DR. A. A. MOON read a paper entitled "The Surgical Treatment of Vesico-Vaginal Fistula following Hysterectomy and Radium Therapy for Carcinoma of the Cervix Uteri. Case Report and Comment" (see page 316).

DR. F. A. MAGUIRE, commenting on Dr. Furber's paper, agreed that all patients who suffered a secondary hæmor-

phage should be taken to the operating theatre and have the hæmorrhage controlled by suture. In one case in which he had encountered repeated secondary hæmorrhages following hysterectomy, he had successfully tied the internal iliac artery by the extraperitoneal approach. Referring to Dr. A. L. Watson's paper, Dr. Maguire said that he did not like the operation of vaginal hysterectomy. In that operation one had to work down a deep hole, the field was restricted and one could never perform the operation without anxiety. Nevertheless there was a use for the operation in specially selected cases. He himself always followed Mayo's technique. Recently he had seen the Spalding Richardson operation brilliantly performed, but he was not impressed with it as an operation. With reference to vesico-vaginal fistula, Dr. Maguire said that formerly 90% resulted from obstetric trauma; now seven out of ten resulted from trauma at operation. Often the operation had been a total hysterectomy. Often if the fistula was small, it would heal if left alone. In operating the essential was to mobilize the fistula properly. Dr. Maguire said that he did not regard colpocleisis as a satisfactory method of treating a vesico-vaginal fistula; irritation of the vaginal mucous membrane, phosphate deposits and stone formation were common sequelae. When the fistula could not be repaired, it was best to transplant both ureters into the bowel by one of Coffey's methods.

DR. H. K. PORTER agreed with previous speakers that in secondary hæmorrhage following hysterectomy the safest treatment was to control the hæmorrhage by suture. Some time earlier after a hysterectomy, repeated secondary hæmorrhages had occurred between the eighteenth and forty-sixth days after operation. During that period on four occasions he had performed suture before control was finally achieved.

DR. F. BELLINGHAM said that he was an advocate of vaginal hysterectomy under low spinal anaesthesia supplemented with a little "Pentothal", which was required to abolish the pain from the pull on the ovarian ligament. In opening the peritoneum he had found it easier through the pouch of Douglas than through the utero-vesical fold.

PROFESSOR B. T. MATES agreed that vesico-vaginal fistula now infrequently followed obstetrical trauma, but he feared that that might not be so if the operation of publotomy gained favour.

Pregnancy Complicated by Subarachnoid Hæmorrhage.

DR. F. BELLINGHAM showed a patient who had had a pregnancy complicated by subarachnoid hæmorrhage. The interest of the case lay in the differential diagnosis, as the patient had been sent into hospital having had what was thought to be an eclamptic seizure in an omnibus. She was admitted to hospital on September 25, 1947, just regaining consciousness. She complained of severe headache and was vomiting. Her blood pressure was 130 millimetres of mercury, systolic, and 83 millimetres, diastolic. Her urine contained a small trace of albumin. Her uterus was enlarged to the size of a twenty-eight weeks pregnancy. Lumbar puncture produced blood-stained cerebro-spinal fluid. There were no localizing neurological signs, although pronounced and increasing neck stiffness developed twenty-four hours later. The tendon reflexes were increased. Examination of the cerebro-spinal fluid on September 26 revealed no organisms. No growth was obtained on attempted culture. The specimen contained a large amount of blood. Treatment was by absolute rest and the administration of sedatives, and the severe headache was relieved only by intramuscular injections of pethidine, 50 milligrammes twice a day being required. Three weeks later the patient's condition was much improved. The headache was less, and no neck rigidity was present. She then had a fresh hæmorrhage, evidenced by severe fronto-occipital headache, neck rigidity and sacral pain. The patient was examined in consultation again by Dr. Hales Wilson, who reported that the only neurological sign was that the plantar reflex of the left foot was not so definitely flexor as that of the right. The fundi were normal. The cerebro-spinal fluid examined on October 21 contained eleven leucocytes per cubic millimetre, and the chloride content was 700 milligrammes per centum. Weakness was present in the right angle of the mouth. The headache was more right-sided. Bilateral nystagmus was present and Oppenheim's sign was detected in the left foot. All the tendon reflexes were brisk. Lumbar puncture was performed; the pressure of the cerebro-spinal fluid was 160 millimetres and was slowly reduced to 140 millimetres, and improvement set in and continued. On November 24 Cæsarean section was performed under spinal anaesthesia. Convalescence was uneventful.

Dr. Bellingham said that apart from trauma, spontaneous rupture of a tiny cerebral aneurysm was the commonest cause of intracranial hæmorrhage in the age period of

twenty to forty years. The great majority of such aneurysms were congenital in origin and occurred at or near the circle of Willis. They were commonly about the size of a pea and might produce focal signs before rupture. Often they were symptomless till spontaneous rupture occurred. From the sudden hæmorrhage into the subarachnoid space any one of several clinical conditions might be initiated—hysteria, diabetic coma, eclampsia and meningitis. Usually there was rapid loss of consciousness, but sometimes it was more gradual, and hysterical behaviour with absence of neurological signs might lead to an error in diagnosis. Soon after the attack the urine often contained much albumin or sugar or both; but air hunger and dehydration were absent. After some hours (or next day) the picture simulated meningitis with fever, neck rigidity and Kernig's sign. Retinal hæmorrhage and slight papilloedema were often present, and should always be sought. The diagnosis might usually be made clinically with fair certainty, but lumbar puncture was all-important for confirmation. The prognosis was always guarded. In Magee's series of 150 patients, 50 died in the first attack, and 50 soon had a second hæmorrhage and 35 of them died. The longest recorded interval between attacks was twenty-two years.

Dr. Bellingham went on to say that treatment consisted in rest, mild sedation and lumbar puncture with gentle withdrawal of cerebro-spinal fluid if the pressure was excessive. When the hæmorrhage appeared to be continuing and neurological signs permitted one to be reasonably sure of the position of the aneurysm, ligation of the internal carotid artery on the same side as the leak was justifiable, but not without risk of hemiplegia. In non-fatal cases an arteriogram might reveal the exact site of the lesion and permit subsequent surgical cure.

Dr. Bellingham then drew attention to several points of interest in the case. (i) The patient had been admitted to hospital with a diagnosis of eclampsia. (ii) The patient had had two hæmorrhages, one when running for an omnibus and one when at rest in bed. In that connexion it was stated that 92% of such hæmorrhages were spontaneous. (iii) Pathological tests on the cerebro-spinal fluid had given interesting findings. The normal number of leucocytes was nil to three or five per cubic millimetre; in cerebral hæmorrhage the number was normal or slightly increased, as in the case under discussion; in meningitis the number was greatly increased. The chloride content was within normal limits (700 to 760 milligrammes per centum). (iv) Cæsarean section was performed under spinal anaesthesia. It had been decided to terminate the pregnancy by that method to avoid the strain of labour. For the same reason spinal anaesthesia was used to ensure that the patient underwent no convulsive efforts or rise in blood pressure.

Histopathological Demonstration.

DR. M. BRITNELL FRASER showed a series of microscopic slides of material removed at various gynecological operations. The slides were from the collection in New South Wales of the Royal College of Obstetricians and Gynecologists.

The first slide was that of the cornual end of a Fallopian tube, which had been removed from a young woman suffering from primary sterility, with obvious blocking of the uterine end of the tube. Microscopic examination of the slide revealed that the lumen was completely blocked by endometriosis. Dr. Fraser suggested, first, that a similar occurrence might account for some cases of ectopic pregnancy in the cornual end of the Fallopian tube, and secondly, that the condition might be more often recognized if sections of the uterine end of the Fallopian tube were prepared more frequently.

The second slide was a specimen of a fibropapilloma of the ovary. Macroscopic examination showed it to be a pedunculated and lobulated fibrous tumour between the right ovary and Fallopian tube; it had been removed from a woman, aged forty-seven years, with multiple fibroid tumours. Microscopic examination of the section revealed a small serous-celled fibropapilloma.

The third slide showed a small papilliferous cystadenoma of the left ovary, removed from a woman, aged twenty-six years, suffering from primary sterility.

In the fourth slide was shown a granulosa cell carcinoma removed from a woman, aged thirty years. The diagnosis was unexpected, as the clinical history had been rather suggestive of ectopic gestation, slight vaginal hæmorrhage having been continuously present for three months. The tumour had replaced the right ovary and measured three centimetres in diameter; cysts were seen in it on macroscopic examination. Microscopic examination revealed extreme follicular hyperplasia of the endometrium. The ovarian tumour consisted of a highly cellular neoplasm, the

cells being in continuous sheets with a minimum of stroma and an occasional Call-Exner body.

In the fifth slide was seen a dysgerminoma of the left ovary from an unmarried woman, aged twenty years; torsion had taken place before operation. Excessive masses of big cells with large dark nuclei were seen; the masses were interlaced with fibrous strands, in which could be seen a number of small round cells.

The sixth slide was from a patient suffering from ovarian fibroma with severe ascites, but no hydrothorax. The tumour was a highly cellular fibroma resembling ovarian stroma, but it was not malignant.

A patient, aged twenty-nine years, suffering from bilateral dermoid cysts, had provided the seventh slide. On the left side no residual ovarian tissue was present, but on the right side the smaller dermoid was removed, some ovarian tissue being left which appeared normal on macroscopic examination. Microscopic examination of the right ovary revealed squamous epithelium, hair follicles and sebaceous glands. The nubbins was smooth, muscular tissue containing glandular elements, resembling those of a pseudomucinous cystadenoma. Dr. Fraser said that the case under discussion strengthened the hypothesis that pseudomucinous cystadenomata were of teratomatous origin.

Finally Dr. Fraser showed a slide from a woman, aged thirty-five years, suffering from obvious tuberculosis; the specimen was an example of tuberculous ulceration of the vulva.

British Medical Association News.

NOTICE.

THE General Secretary of the Federal Council of the British Medical Association in Australia has announced that the following medical practitioner has been released from full-time duty with His Majesty's Forces and has resumed civil practice as from the date mentioned:

Dr. A. C. R. Sharp, 139 Macquarie Street, Sydney (December 20, 1948).

Medical Societies.

THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA

A MEETING of the Medical Sciences Club of South Australia was held on August 13, 1948, at the Anatomy Department, University of Adelaide.

Staphylococcal Bacteriophages and their Use in Typing Strains in Epidemics.

MISS SIBLEY MCLEAN discussed staphylococcal bacteriophages and their use in typing. She said that bacteriophages were filterable viruses which attacked bacterial cells. Like plant and animal viruses, they showed host specificity; there was a close relationship between bacteriophage sensitivity and antigenic structure. Many strains of staphylococci were phage carriers and were known as lysogenic strains. There the symbiosis between phage and host was intimate and the host was not lysed. Phage could be obtained from those strains by cross-plating them with suitable susceptible strains. Phage typing was of great value in epidemiological surveys, because many groups of bacteria, homogeneous by serological tests, could be divided into a number of stable phage types. Twenty-one types had been recognized among staphylococci. Phage typing of staphylococci had been successfully used in tracing the origin of infection in outbreaks of food poisoning and in secondarily infected wounds.

A New Catalytic Function of Hæmoglobin.

PETER M. NOSSAL said that the unusual behaviour of blood systems (which had been shown to catalyse the decarboxylation of oxalacetic acid to pyruvic acid) towards pH and heat led to the suggestion that the agent responsible for the catalysis was oxyhæmoglobin (and the pigments derived from it). By the use of an automatically recording spectrophotometer it had been shown conclusively that the increases in activity of blood systems towards oxalacetate with

lowering pH were paralleled by conversion of oxyhæmoglobin to methæmoglobin and acid hæmatin. Pure crystalline oxyhæmoglobin showed exactly the same effect, which strongly suggested that it was the factor in whole cell hæmolytase which catalysed the decarboxylation. Similarities between the new system and that previously discovered in pigeon liver were cited. Attention was drawn to the unsatisfactory state of present-day knowledge of oxalacetate chemistry and biological decomposition. A full and thorough investigation of both the inorganic and the biological catalyses of oxalacetate decarboxylation mechanisms was reported to be in progress.

The Kinetics of Hæmoglobin Catalysis.

MR. D. I. B. KERR, discussing hæmoglobin catalysis, said that the study of the kinetic data for oxalacetate decarboxylation by hæmoglobin, methæmoglobin and hæmatin indicated a first order process in each case. There was no general acid or base catalysis in the decarboxylation, considerable salt effects were observed with altered buffer concentrations, and the system was sensitive to buffer composition. In such a decarboxylation the method of expressing the catalytic contribution as carbon dioxide evolution in excess of autodecomposition contained a fallacy. From kinetic theory, the procedure of plotting decomposition rates for various residual concentrations seemed a better graphical method for presentation of results; otherwise the catalytic coefficient based upon the ratio of velocity constants for catalysis and autodecomposition was an adequate criterion in such studies. The mechanism of oxalacetate decarboxylation by those pigments via an activated complex between the acid and either the hæmoporphyrin or the protein parts of the pigments had been considered, and further work along those lines was in progress.

A Physiological Approach to the Problem of Enuresis.

DR. N. D. CROSBY discussed enuresis. He said that enuresis was a widespread condition occurring in families of all sections of the community. There had been a great diversity of opinion as to the ætiology of enuresis, which had been ascribed to congenital defect or disease of the uro-genital and other systems; but for many years the greatest emphasis had been placed on the psychological origin. In general practice enuresis showed out as a formidable problem, affecting not only the sufferer but the family as well, most particularly the mother. Somatic and psychological factors did not seem to differ between non-enuretics and a large proportion of sufferers from the condition. Because of that, one elected to consider continence and enuresis as reversible phases of a physiological state. The general physiology of automatic micturition and higher control was reviewed. Continence could occur from voluntary inhibition of the automatic bladder reflex, or from a conditioned inhibition; it was suggested that an inherited organization of the nervous system made it more susceptible to the discomfort of the wet state, so that a conditioned inhibition was set up. That inhibition could become disinhibition on extinction from various factors. An explanation of the clinical phenomena accompanying enuresis was made on that consideration. On the assumption that a conditioned inhibition did play a part, a unit was constructed to reestablish or reinforce the conditioned inhibition. The first results were reviewed briefly; they seemed to warrant further trial. In any case, the unit offered a method of investigating some fundamental physiology at a clinical level, and could be associated with laboratory work. The investigation was said to be proceeding.

A meeting of the Medical Sciences Club of South Australia was held on September 3, 1948, at the Institute of Medical and Veterinary Science, Adelaide.

Microphthalmia in Pigs.

MR. M. F. PULSFORD described the occurrence of a type of microphthalmia in pigs in South Australia. He said that the bulk of the material examined was from pigs slaughtered at the abattoir, and efforts to find field subjects for further study had not been successful to date. The condition as seen macroscopically varied from the presence of an almost normal eye to a small structure, examination of sections of which revealed only a black nodule representing the eye. Some trace of cornea could usually be seen. Microscopical examination showed that all tissues of the eye were abnormally developed and abnormally related one to the other. The field evidence from one subject studied suggested that the condition might be due to a maternal vitamin A deficiency. It had not been possible to incriminate heredity, either from the field examination or from the histological

picture. Until further subjects could be studied in the field, the aetiology could not be determined.

Insulin Therapy in Schizophrenia and Some Theories of its Mode of Action.

DR. JOHN A. LEWIS said that schizophrenia was a complex human reaction, a social breakdown which in the past had had a bad prognosis. The first major weapon introduced in the fight against it was insulin therapy (by Sakel, of Vienna, in 1933). The mode of action of insulin in producing its therapeutic effects in schizophrenia remained obscure. A pronounced vegetative reaction occurred in hypoglycaemia, but the significance of that was not yet understood. Various theories explained the action of insulin in terms of (i) pure psychology, (ii) elimination of most recently acquired reactions, (iii) defensive vegetative mobilization, (iv) cortical damage, and (v) the recovery of previously inhibited responses.

Sensory Reception Areas in the Cortex of the Rat.

DR. D. H. LEMESSURIER outlined the technique of cortical reception and discussed the construction of regional maps. Maps showing the primary reception areas for auditory, visual and somatic representation were displayed. Emphasis was laid on somatic area II with its bilateral representation of the body and on the auditory responses also found in this area, and the possible significance of this area was made the basis of a conjecture. In conclusion, attention was drawn to the importance of such work as a reference for ablation and psychosomatic researches. At the same time it was made clear that the rat, from the cortical organization point of view, was highly organized and was far from the lowly creature referred to by some writers.

Correspondence.

OBITUARY NOTICE OF THE LATE CLARENCE GRAHAM GODFREY.

SIR: I am in receipt of a letter from Dr. Ernest Jones (February 15, 1949) in which he points out that he, Dr. Jones, not Dr. Godfrey, was responsible for the establishing of Lara as an institute for the treatment of inebriates.

It appears that the government of the day intended to use Royal Park Hospital as an institution for inebriates, but Dr. Jones, who was then head of the department of mental hygiene, persuaded them to purchase Lara for this purpose and use Royal Park as a hospital for mental disorders. Dr. Godfrey was then senior medical officer under Dr. E. Jones and was appointed by the latter in charge of Lara.

Dr. Jones appears desirous that this mistake on my part should be corrected through your columns. I regret the mistake. I had always thought that Dr. Godfrey was responsible for the opening of Lara Institute. I should be glad if you would make this correction.

Yours, etc.,
PAUL G. DANE.

111 Collins Street,
Melbourne, C.I.,
February 18, 1949.

PENICILLIN IN LIQUOR AMNII.

SIR: I should like you to publish the following investigations that I have carried out on the concentration of penicillin in the liquor amnii in relation to the concentration of penicillin in the mother's blood estimated simultaneously. As I have found no reference in the literature to similar estimations, I thought that my findings might be of interest to readers.

The investigations were carried out upon Miss B., aged nineteen years, who attended the Queen Victoria Maternity Home for the first time when approximately thirty-six weeks pregnant. Her blood yielded a "++++" Wassermann reaction. She was admitted to the Royal Adelaide Hospital on September 16, 1948, and treatment was commenced with the intramuscular injection of 40,000 units of penicillin every three hours. Also, on account of the late discovery of the "++++" Wassermann reaction, I decided to give her one injection of "Novarsenobillon" (0.6 gramme) intravenously and one injection of 1.0 millilitre of bismuth oxychloride (20%) intramuscularly each week. The estimated date of

confinement was October 8, 1948, but labour did not commence until October 14.

On October 13 the following procedure was carried out. Approximately three hours after the last injection of penicillin, a lumbar puncture needle was inserted through the anterior abdominal wall just below the umbilicus, into the amniotic sac, and 2.0 millilitres of liquor amnii were removed; at the same time 2.0 millilitres of blood were withdrawn from the antecubital fossa of the mother. The mother was then given 40,000 units of penicillin, and liquor amnii and mother's blood were withdrawn simultaneously at half an hour, one hour and two hours after the injection. Finally, when the baby was born, blood was withdrawn from its anterior fontanelle, and blood was again taken from the mother. The time of taking samples of blood from the infant and the mother was approximately two and a half hours after the last injection of penicillin into the mother.

The results are shown in Table I. Fleming's slide cell technique for the estimation of penicillin in blood serum was used (*The Lancet*, November 11, 1944, page 620).

TABLE I.

Time, in Relation to Test Dose of Penicillin. (40,000 Units.)	Maternal Blood. (Units per Millilitre.)	Liquor Amnii. (Units per Millilitre.)
Just before	0.5	2.0
Half an hour after	1.0	16.0
One hour after	0.5	4.0
Two hours after	0.13	2.0

After the birth of the child there was less than 0.06 unit per millilitre in the mother's blood and 0.06 unit per millilitre in the infant's blood.

Two and a half hours after the last dose of penicillin, examination of the liquor amnii revealed no detectable arsenic.

That the inhibiting action of the liquor amnii was due to penicillin was shown by the following means: 10% by volume of a penicillinase preparation was added to the sample of liquor taken two hours after the test dose of penicillin, and the mixture was allowed to stand for half an hour at room temperature. Titration of this "penicillin inactivated" sample failed to reveal any inhibiting activity even in the undiluted sample.

The interesting point to note about the investigations is the great concentration of penicillin to which the foetus is subjected when the mother is treated. Moreover, the foetus is more or less in a closed circuit of penicillin, inasmuch as the infant swallows the liquor and is resubjected to the action of the penicillin it contains, some of which is again excreted by the fetal kidneys and again absorbed.

Finally, the penicillin concentration in the infant's blood after birth is higher than that contained in the mother's blood.

I wish to acknowledge the encouragement of Dr. Brian H. Swift, and the assistance of Miss N. Atkinson and Mr. R. A. Sheppard, of the Institute of Medical and Veterinary Science of South Australia, in carrying out the investigations.

Yours, etc.,
H. E. PELLEW.

Bank of New South Wales Chambers,
North Terrace,
Adelaide.
December 28, 1948.

THE TREATMENT OF CARCINOMA OF THE LIP.

SIR: I notice with some surprise that in your issue of December 25, 1948, a brief account is given of articles in two American publications of August, 1948, in which surgery appears to be the preferred treatment for cancer of the lip.

This could have been understood some years ago when interstitial radium or radon was the most generally used radiotherapeutic measure for this complaint. This necessitated at the least attendance at hospital, if not incarceration, and gave rise on occasion to a measure of scarring. But in this year of grace when treatment needs only attendance for a few minutes on a few occasions for exposure to X ray, and unless glands are involved avoids admission to hospital altogether, it is less easy to agree.

Cancer of the lip is a disease most amenable to treatment by radiotherapy and the results are good. Why, therefore, use much-needed hospital beds and subject the patient to surgery?

The papers quoted give a three-year cure rate of 67% or for those who received all their treatment at the one hospital 81%. It is not stated in your abstract whether this is an absolute cure rate, that is, the number alive and well more than three years after treatment without allowance being made for those untreated, dead of other disease or untraced. If it is an absolute cure rate there is no doubt that these figures, particularly the latter, are reasonably satisfactory. It would be interesting to know if any cases were excluded as inoperable.

The only figures that I can quote are those of the radiotherapy clinic at the Royal Adelaide Hospital. They are not quite as good as the figures given above, but for this several reasons may be adduced. To begin with, they are five-year figures, which allows greater time for deaths from intercurrent disease; secondly, the cases date back to nearly twenty years ago, to the very beginning of radiotherapy at the hospital when dosage and distribution of radium were in an early stage of their evolution; and thirdly, there is no doubt that some of the earlier cases, particularly those treated with deep X ray, were underdosed.

The over-all figures show that from 1929 to 1942, inclusive, 646 cases of this disease were treated at the radiotherapy clinic. Of these a number were considerably advanced. To give an example, I can remember a patient in whom the growth completely encircled the oral opening. The treatment was mostly by interstitial radium or radon. The absolute five-year cure rate for these 646 cases was 61%. If those dead of intercurrent disease, the lip and gland areas remaining well, are excluded the rate rises to 70%, while if those untraced are also excluded it becomes 85%. There are, besides, a few cases who developed recurrences and are well for more than five years from the first treatment, but not yet from the second. These are not shown as cures.

In later years the treatment has been changed and almost all cases are now treated with X rays, usually at 110 kilovolts, but occasionally at a higher kilovoltage for the more advanced lesions. A recent check of 53 cases so treated and remaining well for periods varying from about two years to over three years shows an absolute cure rate of 94%. While this cannot strictly be compared with definite three-year rates I have every reason to believe that the lapse of the full three years will show a rate of survival free from apparent disease of over 90%.

To explain the reason for this belief I must refer to my private practice. During the sixteen years that I have used radiotherapy in my practice I have had no case of epithelioma of the lip treated privately that failed to resolve with such treatment. The total treated numbers several hundreds.

Of these cases I know only one that recurred at the primary site. This patient is of some interest. He underwent a local excision of a growth in his lower lip which, however, immediately recurred, so that when I first saw him he had an unhealed wound with carcinoma in its whole extent and beyond.

He was treated with heavy doses of X rays at 200 kilovolts, the growth disappeared and the lip healed. A few months later a recurrence developed at the primary site and Mr. Jose performed a wide removal, bringing round part of the upper lip to fill the gap in the lower. He remains well over two years later.

I have now used radiotherapy for eighteen years, part of this time in England, but for treatment of cancer of the lip my method has undergone several changes. At first I used radium moulds, and then interstitial radium or radon, but for the last nine years practically all my private cases have been treated with X rays. The only exceptions in this latter period were a few cases in which the growth had extended along the buccal surface of the cheek. These were treated with interstitial radiation.

I cannot claim a complete follow-up of these cases, but I have seen many of them repeatedly for other lesions, and others were watched for years. As I have said, I know of only one recurrence at the primary site, and I know of no death from metastasis in the whole group. One patient certainly did attempt to commit suicide and died under an anaesthetic, but he had had his glands dissected, and a careful post-mortem examination including the brain revealed no trace of growth.

This brings me to another point I should like to make. While secondary involvement of glands is in my experience relatively uncommon, when it occurs it should undoubtedly be dealt with surgically. On occasion, however, one may find a gland that has become attached to the mandible at an early stage. Some surgeons are apt to characterize this as inoperable, but if the involved glands be small in extent a good result may yet be achieved by removing the glands and portion of the mandible in one block. I saw this done in England a few times with good effect.

I can remember one such patient—in Australia—that I referred to a surgeon three times before he grudgingly consented to carry out this measure, which he stigmatized as a "palliative procedure". The patient remains well without sign of recurrence over five and a half years later.

I am aware that to be of full value I should give figures and follow-up results for my private cases. This I am at present unable to do.

My conclusions are:

1. Radiotherapy is the treatment of choice for cancer of the lip at the primary site, not only because the results are excellent, but because properly carried out there is a minimum of scarring. Admission to hospital is also usually avoided.

2. Dissection of the glands should be performed when these are involved, but not as a routine.

3. Should the primary lesion fail to resolve it should be surgically removed.

Finally, I should like to acknowledge my indebtedness to Dr. Molesworth, who, I believe, pioneered the use in Australia of X rays for this disease. I can well remember him demonstrating his method at a cancer conference at Canberra in 1934.

There is more than could be said, but out of consideration for your readers I refrain.

170 North Terrace,
Adelaide,
January 14, 1949.

Yours, etc.,
JOHN MAYO.

Obituary.

DONALD WALLACE.

We are indebted to Dr. W. J. McCristal for the following appreciation of the late Dr. Donald Wallace.

It so happens, at times, that distinguished members of our profession pass on and leave in their train a veritable host of treasured memories. Those of us who have been privileged to come within the ambit of their influence and fail to place on record their character and achievements are the more subject to reproach. It is for this reason that I essay the task, for Donald Wallace was a remarkable doctor, scholar and man. I do so with considerable apprehension, since it is not easy to do justice to these components in the space I assume to be available. Probably no one of us is exempt, at some time or other, from qualms of conscience and regrets, in that we have omitted to reap to the full the advantage to be derived from our contacts. I can envisage none to whom this applies in greater measure than Donald Wallace. One yearns to have had that recording brain that could store the riches that flowed from his superlative mind.

On my return from Egypt in 1916, I went, as I thought for a short time, to the Coast Hospital, Little Bay—subsequently renamed the Prince Henry Hospital. Colonel Millard, the medical superintendent, was away on army service and Donald Wallace was prevailed on to remain as acting medical superintendent. It was soon brought to my notice how this really good and unusual man inspired all those about him, and there are many today who cherish the fruits of their association with him.

I have frequently been asked what manner of man he was. He was very tall, very thin, somewhat stooped, with clear-cut features and kindly searching eyes, which radiated an intellect which was winsome and arresting. He was of humble and gentle bearing and, though he was compassionate towards human frailties, one shank from being the unhappy victim of a manner he had of whimsical reproach.

To cite examples:

There was the resident medical officer, excellent but a little bumptious, who, during an operation, in a petulant way tossed a really non-offending forceps to the floor. Donald Wallace, who, as custom had it, was acting as sponsor for both operator and patient, exclaimed: "Oh, oh, making a noise like a real surgeon, eh!" The resident medical officer subsequently had a large country practice.

Then the nurse, one of his elect, who had seemed indifferent to his admonishments. Said he: "It is ever the way. If I were to say you were the most disobedient and lazy nurse in the hospital, you would wince a little, but soon get over it; if I were to say you were rude and careless of the truth, you would take it to heart a little more; if I were to say you were the least competent and intelligent nurse in the hospital, you would hold it in for me for a longer time; but

If I were to tell you that you were the worst figured and ugliest girl in the hospital I would make an enemy of you for life." This nurse won the Royal Red Cross in World War II.

Then the minister of religion: A topic in the form of drollery ensued at lunch as to the relative merits of female groups in two capital cities. A somewhat militant clergyman who was present, becoming impatient, applied the gag with: "When I was a pastor in B—— the girls there may not have had good figures, good looks and glamour and been ultra-modern, but they could housekeep, they could cook and they could sew; in fact I would give them the palm." Said Wallace: "Yes, you would give them the palm, but you would not invite them to a picnic." The minister spluttered a protest and resigned himself to the impish yet purposeful commentary on human nature.

Donald Wallace was born at Wingham, North Coast, of Scotch parents who later settled on the Camden Haven River. At an early age he came to Sydney in quest of education. He became apprenticed to a trade and, after saving enough money from his wages, he waited on Mr. A. B. Weigall, Headmaster of Sydney Grammar School, and asked to be admitted. He had read three books on the home shelf: The Bible, a book on philosophy and Baxter's "Call to the



Unconverted". Of schooling he had little or none, yet in one year and three months he qualified for matriculation, gaining five A's and two B's. "This", said Mr. Weigall to the gathering on Speech Day, "was the most creditable pass in the examination. But not only is he able and hard working, he is a most brave and honourable gentleman." It is recorded that Sir William Windeyer cordially and effusively shook hands with him and seemed proud to do so. Hegel was presumably quoted in the book on philosophy, and this created a desire in him to learn German so that he could read Hegel in the original. Of the school examination papers in German submitted to Melbourne, Donald Wallace not only was the only one to pass, but received 100%.

Going on to the university in 1895, he entered the faculty of arts, and, in 1897, gained the university medal for logic and mental philosophy on graduating as Bachelor of Arts. In 1898 he won the gold medal donated by Professor Anderson for the best essay on a philosophical subject and so graduated to Master of Arts.

In his final year in medicine he gained first-class honours and, in addition to other prizes, was awarded the John Harris Scholarship in physiology and anatomy.

And so to his professional attainments. As one might expect, his surgery was of character and refinement, performed with deftness and meticulous care. His respect for tissue amounted almost to an obsession, yet he was intrepid and enterprising as occasion demanded. I think I am right in saying that he was the first to operate for perforation of the bowel in typhoid fever, and, in several such cases, I was witness to his celerity and judgement. He was an acknowledged authority on leprosy and during his stay in Calcutta—he travelled extensively—he was the guest of Sir Leonard Rogers, a world authority on the disease.

Space does not permit of other instances I could cite of his accomplishments in the fields of medicine, surgery and infectious disease; suffice it to say that he could take his place among the first line consultants in all three. There is need for a suitably sized volume on Donald Wallace, and should there be anyone with time to spare and of journalistic trend who kept up continuity of contact, I am sure the medical historian would welcome him gladly. He would be beset at the outset with the problem that Wallace was a recluse in the matter of public gaze. I am indebted to his barrister friend, Mr. N. G. McWilliam, for a theme of Wallace's for the proper man which started "No meretricious wishes to beguile" and ended with "He stands majestic in his own simplicity". There are many, including his devoted wife, who was Constance Tompkins, a former staff sister at the Coast Hospital, who could provide the wealth of anecdote and details of his career. They would or should be no longer held to bondage where Wallace's confidence might be reposed.

I have frequently delved for a figure in history that might provide a counterpart to Donald Wallace. In outlook, disposition, innate resolve and devotion to the betterment of mankind, he was a modern Thomas à Kempis, and I know "The Imitation of Christ" was ever at his elbow. In retrospect, I am sure his life was one long sigh that he himself should fulfill the aspirations and heed the injunctions contained therein. Yet he was never dull or ponderous, and his whimsicalities and caprices made of him an interesting companion. He chafed at being the unwitting agent of a system whereby the patient, in addition to being sick, is further afflicted by having to pay for it. The monetary reward, though hard and well earned, was incidental to his life. Had Donald Wallace engaged in private practice, his income would have been equally at the mercy of some persuasive mendicant as were his wardrobe and his money box. When faced with a diagnostic problem, he had a habit of indulging a philosophic doubt which, to the undiscerning, made his medical competence suspect. Frequently it heralded a brilliant concept.

Prophecies in the form of declamations can and may be odious. Be that as it may, I permit myself to say that there never will be Donald Wallace's like again.

Dr. W. M. A. Fletcher writes: Dr. Donald Wallace was born at Wingham on the Manning River, where he was brought up on a dairy farm. It was said that he would go round the paddock after cows with a book in his hand. He received his primary education at the local school and then proceeded, on a scholarship, to the Sydney Grammar School where he finished up as *dux* of the school. Proceeding to the university he did a brilliant course in arts, graduating with first-class honours in philosophy. He then entered the medical faculty, where he again had a brilliant course and graduated with honours. Whilst doing his third year medicine he took his M.A. degree in philosophy with first-class honours and the gold medal, which had not been awarded for some years. On graduation he became resident medical officer at the Royal Prince Alfred Hospital and afterwards at the Royal Alexandra Hospital for Children. On leaving the latter hospital he went to the Coast Hospital, now called the Prince Henry Hospital, where he did his best work and became deputy superintendent.

At the Coast Hospital he was a very fine surgeon, very popular with staff and patients alike. He was especially beloved by the poor of the Botany district. Of a humble and retiring disposition he refused a lucrative offer to go to Macquarie Street with a well-known surgeon since passed away.

He was a beautiful Christian character, an idealist who lived up to his beliefs to the full. He was a very charitable man. I am afraid in many cases advantage was taken of this by people who did not need help.

After leaving the Prince Henry Hospital he became medical superintendent of the Liverpool State Hospital before retirement. Never a robust man, he passed to his well-earned rest after a long illness in the Royal North Shore Hospital last October.

Hospitals.

THE ROYAL MELBOURNE HOSPITAL OLD STUDENTS' ASSOCIATION.

The annual reunion meeting of the Royal Melbourne Hospital Old Students' Association will be held on March 18 and 19, 1949. The following is a summary of the programme:

Friday, March 18, 1949: 12.30 p.m., buffet luncheon; 1 p.m., clinico-pathological meeting conducted by Dr. E. S. J. King;

2 p.m., ward rounds with Dr. A. E. Coates, Dr. B. K. Rank, Dr. B. T. Keon-Cohen, Dr. L. E. Hurley, Dr. Ian J. Wood and Dr. E. Graeme Robertson; operative demonstrations: 6.30 p.m., reunion dinner at the Union House, University of Melbourne. Saturday, March 19, 1949: 10 a.m. to 12 noon, demonstrations in the out-patient department; 12.30 p.m., buffet luncheon; 2 p.m. to 4 p.m., a series of short lectures by Dr. K. F. O'Donnell, Dr. S. Fitzpatrick, Dr. I. Maxwell and Professor F. M. Burnet.

Visitors and all Old Students are invited to attend. All Old Students intending to be present at the reunion dinner are requested to notify the Honorary Secretary, Dr. Kenneth Grice, Royal Melbourne Hospital, as soon as possible.

The Royal Australasian College of Physicians.

Sims Commonwealth Travelling Professor, 1949.

PROFESSOR G. W. PICKERING, Sims Commonwealth Travelling Professor for 1949, will deliver the following lectures in the Main Lecture Theatre of the University of Queensland Medical School, Herston, Brisbane, at 8 p.m.: Friday, March 18, 1949: "Hypertension" (Lecture Number 1); Monday, March 21, 1949: "Hypertension" (Lecture Number 2). The lectures will be open to all members of the medical profession.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Murray, Valerie Ruth, M.B., B.S., 1948 (Univ. Sydney), Lithgow District Hospital, Lithgow, 2W., New South Wales.

Doherty, William Valentine, M.B., B.S., 1947 (Univ. Sydney), 88 Wycombe Road, Neutral Bay.

Fitzhardinge, Julie Maude, M.B., B.S., 1946 (Univ. Sydney), 47 Darley Road, Randwick.

THE undermentioned have been elected as members of the South Australian Branch of the British Medical Association:

Ronal, Tibor, M.B., B.S., 1948 (Univ. Adelaide), 26 Dequetteville Terrace, Kent Town, South Australia.

Cornish, Brian Leslie, M.B., B.S., 1947 (Univ. Adelaide), 126 Kensington Road, Toorak Gardens, South Australia.

Rice, Lawrence John, M.B., B.S., 1948 (Univ. Adelaide), 59 Portrush Road, Tasmore.

Douglas, Hugh Matheson, M.B., B.S., 1947 (Univ. Adelaide), 170 Cross Road, Malvern.

Hicks, Dene Alan, M.B., B.S., 1948 (Univ. Adelaide), 6 Aver Avenue, Reade Park, South Australia.

Bowey, Ross Richard, M.B., B.S., 1948 (Univ. Adelaide), Royal Adelaide Hospital, Adelaide.

Nicholls, Kelynn Elmo, M.B., B.S., 1948 (Univ. Adelaide), Royal Adelaide Hospital, Adelaide.

Waddy, John Lane, M.B., B.S., 1948 (Univ. Adelaide), 5 Waterloo Street, Glenelg, South Australia.

Auricht, Reginald Theodore, M.B., B.S., 1948 (Univ. Adelaide), Royal Adelaide Hospital, Adelaide.

Jarvis, Ronald Harris, M.B., B.S., 1948 (Univ. Adelaide), Royal Adelaide Hospital, Adelaide.

Medical Appointments.

Dr. E. S. Morris, Dr. E. L. Morgan, Dr. H. G. Wallace, Dr. J. G. Drew and Dr. H. W. T. Chenhall have been appointed members of the Advisory Committee for the purposes of the *Pure Foods Act*, 1908, of New South Wales.

Dr. A. Fryberg, Dr. T. H. R. Mathewson and Dr. B. F. R. Stafford have been appointed members of the Nurses and Masseurs Registration Board in pursuance of the provisions of *The Nurses and Masseurs Registration Acts*, 1923 to 1948, of Queensland.

Diary for the Month.

MARCH 8.—New South Wales Branch, B.M.A.: Executive and Finance Committee.

MARCH 10.—Victorian Branch, B.M.A.: Organization Subcommittee.

MARCH 11.—Queensland Branch, B.M.A.: Council Meeting.

MARCH 14.—Victorian Branch, B.M.A.: Finance, House and Library Subcommittee.

MARCH 15.—New South Wales Branch, B.M.A.: Medical Politics Committee, Ethics Committee.

MARCH 16.—Western Australian Branch, B.M.A.: Annual General Meeting.

MARCH 17.—Victorian Branch, B.M.A.: Executive Meeting.

MARCH 23.—Victorian Branch, B.M.A.: Council Meeting.

MARCH 24.—New South Wales Branch, B.M.A.: Clinical Meeting.

MARCH 25.—Queensland Branch, B.M.A.: Council Meeting.

MARCH 29.—New South Wales Branch, B.M.A.: Council Quarterly.

MARCH 31.—New South Wales Branch, B.M.A.: Annual Meeting.

MARCH 31.—South Australian Branch, B.M.A.: Clinical Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

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